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D'APPOLONIA CONSULTING ENGINEERS INC PITTSBURGH PA
NATIONAL DAM SAFETY PROGRAM. NANTICOKE CREEK WATERSHED PROJECT---ETC(U)
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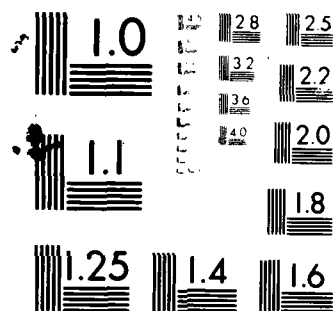
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life or property.

The spillway capacity was evaluated according to the recommended procedure and was found to pass the required spillway design flood of 100 percent of the Probable Maximum Flood (PMF). Therefore, the spillway capacity is rated as adequate.

PREFACE

This report is prepared under the guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NANTICOKE CREEK WATERSHED PROJECT -
FLOODWATER RETARDING DAM SITE 7-B
N.Y. 605
DEC I.D. NO. 85D-3699
SUSQUEHANNA RIVER BASIN
TIOGA COUNTY, NEW YORK

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G. STABILITY ANALYSES

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Nanticoke Creek Watershed Project -
Floodwater Retarding Dam Site 7-B
N.Y. 605

State Located: New York

County Located: Tioga

Stream: Ketchumville Branch Nanticoke Creek
(a tributary of Nanticoke Creek)

Date of Inspection: March 25, 1981 and June 3, 1981

ASSESSMENT

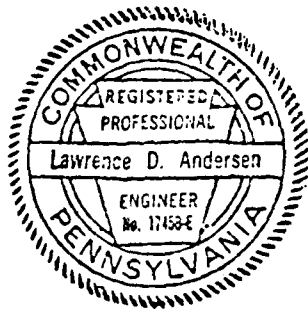
Based on the evaluation of the existing conditions, the condition of the Nanticoke Creek Watershed Project-Floodwater Retarding Dam Site 7-B is considered to be good. The examination of documents and visual observations did not reveal conditions which constitute a hazard to human life or property.

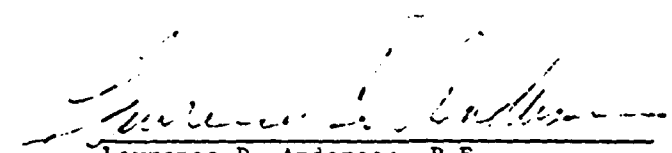
The spillway capacity was evaluated according to the recommended procedure and was found to pass the required spillway design flood of 100 percent of the Probable Maximum Flood (PMF). Therefore, the spillway capacity is rated as adequate.

The following recommendation should be implemented within three months from notification to the owner:

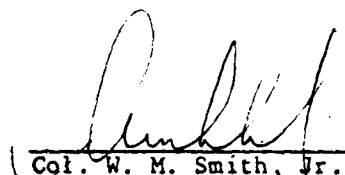
1. An emergency action plan should be developed, including a formal warning system to alert the downstream residents in the event of an emergency.

Assessment - Nanticoke Creek Watershed Project-Floodwater Retarding
Dam Site 7-B




Lawrence D. Andersen, P.E.
Vice President
D'Appolonia Consulting Engineers, Inc.
Pittsburgh, Pennsylvania

Approved by:


Col. W. M. Smith, Jr.
New York District Engineer

Date:

14 Aug 81

NANTICOKE CREEK WATERSHED PROJECT -
FLOODWATER RETARDING DAM SITE 7-B

N.Y. 605

DEC I.D. 85D-3699

MARCH 25, 1981



OVERVIEW

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NANTICOKE CREEK WATERSHED PROJECT -
FLOODWATER RETARDING DAM SITE 7-B
N.Y. 605

DEC I.D. NO. 85D-3699
SUSQUEHANNA RIVER BASIN
TIOGA COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I Inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

The inspection was to evaluate the existing conditions of the subject dam to identify deficiencies and hazardous conditions, determine if they constitute hazards to life and property, and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Dam and Appurtenances

Nanticoke Creek Watershed Project-Floodwater Retarding Dam Site 7-B consists of an earth embankment approximately 830 feet long with a maximum height of about 44 feet from the downstream toe. The embankment has a crest width of 15 feet and an upstream slope of 3 horizontal to 1 vertical, with a 10-foot-wide berm near the normal pool level. The downstream slope is 2.5 horizontal to 1 vertical. The upstream and downstream faces of the dam are covered with grass.

The spillway facilities for the dam consist of a vegetated earth emergency channel located on the left abutment and a riser-type primary spillway located at the center of the dam. The emergency spillway is a trapezoidal earth channel with a base width of 165 feet and side slopes of 3 horizontal to 1 vertical. The primary spillway structure is comprised of a concrete inlet riser structure which discharges into a 30-inch reinforced concrete pipe terminating at a concrete impact basin at the downstream toe. Under normal conditions, the reservoir level is maintained at the crest level of a one-foot ten-inch-wide by one-foot seven-inch-high rectangular orifice on the upstream side of the riser. The outlet pipe has been provided with antiseep collars.

The dam is equipped with a 16-inch-diameter reservoir drainpipe, extending from the upstream toe to the primary spillway riser. Flow through the pipe is controlled by a manually operated sluice gate at the primary spillway riser.

b. Location

The dam is located on Ketchumville Branch of Nanticoke Creek, a tributary of Nanticoke Creek approximately five miles northwest of Maine in Tioga County, New York. Plate 1 illustrates the location of the dam.

c. Size Classification

The dam is classified to be of intermediate size based on its 44-foot height and 1,007 acre-feet maximum storage capacity.

d. Hazard Classification

The dam is classified to be in the high hazard category. A school located about 4.5 miles downstream from the dam and a farm located about 2.5 miles downstream from the dam are considered to be within the potential floodplain of Ketchumville Branch of Nanticoke Creek.

It is estimated that failure of the dam under maximum pool level would cause loss of more than a few lives and appreciable property damage in this area.

e. Ownership

The dam is owned and operated by Broome County, New York. (Address: Broome County Commissioners, P.O. Box 1766, Binghamton, New York 13902, (607) 772-2100)

f. Purpose of Dam

The dam is a floodwater retarding structure.

g. Design and Construction History

The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service (SCS) in 1967. Construction of the dam was completed in October 1970.

h. Normal Operating Procedure

The reservoir is normally maintained at the crest level of the uncontrolled orifice on the upstream side of the primary spillway riser at Elevation 1180.4 (USGS Datum). The primary spillway crest is at Elevation 1201.1, and the emergency spillway crest is at Elevation 1207.3.

1.3 PERTINENT DATA

Elevations referred to in this section and subsequent sections of the report were obtained from design and as-built drawings.

<u>a. Drainage Area (sq. mi.)</u>	3.6
<u>b. Discharge at Dam (cfs)</u>	
Principal spillway at top of dam	138
Auxiliary spillway at top of dam	7420
Reservoir drain at top of dam	40 ⁺
Total spillway capacity at top of dam	7558
<u>c. Elevation (USGS Datum) (feet)</u>	
Top of dam	1213.0
Auxiliary spillway crest	1207.3
Principal spillway crest	1201.0
Low stage inlet, invert elevation (normal pool)	1180.4
Reservoir drain, invert elevation	1174.0
<u>d. Reservoir (acres)</u>	
Surface area at top of dam	65.4
Surface area at crest of auxiliary spillway	52.5
Surface area at crest of principal spillway	39.4
Surface area at low stage inlet (normal pool)	4.0
<u>e. Storage Capacity (acre-feet)(1)</u>	
Top of dam	1007
Auxiliary spillway crest	975
Principal spillway crest	384
<u>f. Dam</u>	
Type	Earth embankment
Length	830 feet
Height	44 feet
Top width	15 feet
Side slopes	Downstream: 2.5H:1V
	Upstream: 3H:1V
Zoning	Yes
Impervious core	No
Cutoff	Yes
Grout curtain	No
<u>g. Primary Spillway</u>	
Type	Drop Inlet
Length	15 feet (weir length)
Crest elevation	1201.0
<u>h. Emergency Spillway</u>	
Type	Trapezoidal earth channel
Length	165 feet
Crest elevation	1207.3

(1) Storage capacity above normal pool level.

i. Regulating Outlet
Type

Length

Access

Regulating facilities

16-inch cast iron
pipe

24 feet

Accessible through
riser

Sluice gate

SECTION 2: ENGINEERING DATA

2.1 DATA AVAILABLE

Available information was obtained from New York State Department of Environmental Conservation, Dam Safety Division files, and from the files of the SCS in Syracuse, New York. Available information includes design and as-built drawings, engineering reports, and dam inspection reports by the SCS.

2.2 GEOLOGY

The Dam at Site 7-B is located in the glaciated Allegheny Plateau section of the Appalachian Plateau Province. A regional geology map is included in Appendix F. This region is characterized as a maturely dissected plateau with the topographic features modified by continental glaciation, including deposition of glacial till in the valleys.

The dam site is north of a northeast trending anticline (approximately north 70 degrees east). The folding is gentle with the maximum dip of the limbs being one to two degrees. The dip of the strata are affected locally by the folding; however, regionally, the rock strata dip south to southwest at approximately 100 to 150 feet per mile. The most prominent fracture orientations in the region have a strike of north 10 degrees west and are nearly vertical. A secondary fracture trace strikes north 60 to 65 degrees east and is vertical, and less prominent fractures strike north 75 to 80 degrees west and north 15 degrees east. A prominent north 30 degrees west linear trends through the dam.

The rock strata in the area consist of unconsolidated Pleistocene glacial till (Binghamton Drift) underlain by strata of the Sonyea Group (Upper Devonian Age). The glacial till consists of a mixture of clay and silt with varying quantities of gravel. The glacial till is relatively thin on hilltops and slopes and thicker in the valleys. The glacial till in the valley is greater than 50 feet thick. The bedrock consists of a thick sequence of interbedded gray calcareous shale, gray and greenish-gray siltstone and silty shale, brown, gray, and dark gray shale, and black fissile shale. The top of the ridges above the dam contain strata of the Lower West Falls Group, in this area consisting primarily of gray to black shale, with a few siltstone layers.

The abutment slopes are relatively gentle and not susceptible to landslide slope movement.

2.3 SUBSURFACE INVESTIGATION

A subsurface investigation was conducted by the SCS in 1967. This program consisted of 10 borings and 12 test pits. Boring and test pit logs are available in SCS files.

The soils in the vicinity of the dam were classified as mottled glacial till consisting of silty gravel, clayey gravels, and sandy silts. Bedrock has not been encountered within the 50 feet of exploration depth.

2.4 EMBANKMENT AND APPURTENANT STRUCTURES

Plates 2 through 8 show the plan and details of the dam and appurtenant structures. The dam is a zoned embankment, incorporating a centrally located cutoff trench and an internal drainage system. The same borrow material was used in both zones of the embankment. In the central core section, maximum rock size was limited to six inches and the material was placed in nine-inch lifts. In the flanking zones, maximum rock size was 16 inches and maximum lift thickness was 24 inches.

The internal drainage consists of a trench drain parallel to the embankment axis, located beneath the downstream toe. The internal drainage system discharges into the primary spillway impact basin at the downstream toe.

The spillway facilities were designed based on hydrologic and hydraulic analyses conducted by the SCS. The design calculations are available in SCS files.

2.5 CONSTRUCTION RECORDS

The dam was constructed under the supervision of the SCS. Complete construction records are available in SCS files. No major post-construction changes were instituted.

2.6 OPERATING RECORDS

Because the dam is an ungaged flood retarding structure, no operating records are maintained for the dam. During severe weather conditions, the dam is monitored by the SCS and Broome County personnel.

2.7 EVALUATION OF DATA

The information obtained from the state and SCS files is considered to be adequate for Phase I inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspections of the dam were conducted on March 25 and June 3, 1981. On both dates, the pool level was approximately at the invert level of the rectangular orifice located on the upstream face of the riser.

b. Embankment

No signs of distress, seepage, or misalignment were observed. The faces of the dam and the crest are covered with grass and were found to be adequately maintained. Some small animal holes were observed on the downstream face. The top of the dam was surveyed relative to the emergency spillway crest elevation and was 0.1 to 0.6 foot above the design level.

c. Primary Spillway

The primary spillway facilities consist of a concrete drop inlet structure discharging into a 30-inch reinforced concrete pipe with antiseepage collars and terminating at an impact basin at the downstream toe. Components of the primary spillway were in satisfactory condition.

d. Emergency Spillway

The emergency spillway is a trapezoidal vegetated earth channel located on the left abutment. The emergency spillway channel was in good condition. The grass cover is well established and adequately maintained. The approach and discharge channel were free of brush and trees or debris which could pose a potential for blockage of the spillway.

e. Reservoir Drain

The reservoir drain facilities consist of a 16-inch-diameter cast iron pipe, extending from the upstream toe to the primary spillway riser. Flow through the pipe is controlled by a manually operated sluice gate located in the primary spillway riser. The system is reported to be operational.

f. Downstream Channel

The downstream channel below the primary spillway concrete impact basin is the natural stream bed. The channel appears to be stable in the near vicinity of the dam.

g. Reservoir

There are no visible signs of instability or sedimentation problems within the reservoir area.

3.2 EVALUATION

The dam was found to be in good condition. At this time, no conditions were observed that would require remedial action.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

The reservoir is normally maintained at the crest level of the rectangular orifice inlet with excess inflow discharging through the primary spillway riser. The dam is a flood-retarding structure and has no formal operating procedure.

4.2 MAINTENANCE OF THE DAM

The dam is maintained by Broome County Soil and Water Conservation District and the maintenance condition of the dam is considered to be satisfactory.

4.3 WARNING SYSTEM IN EFFECT

No formal warning system exists for the dam.

4.4 EVALUATION

The maintenance condition of the dam is considered to be good. Development of an emergency action plan is considered to be advisable. It is reported by the SCS, Broome County office, that such a plan is currently being prepared.

SECTION 5: HYDRAULIC/HYDROLOGY

5.1 DRAINAGE AREA CHARACTERISTICS

Nanticoke Creek Watershed Project-Floodwater Retarding Dam Site 7-B has a drainage area of 3.6 square miles. The watershed is comprised of woodlands and farmlands. Relief ranges from moderate to steep.

5.2 ANALYSIS CRITERIA

The PMF inflow hydrograph for the reservoir was determined using the Dam Safety Version of the HEC-1 computer program developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers. The data used for the computer input are presented in Appendix D.

5.3 SPILLWAY CAPACITY

The spillway facilities for the dam consist of primary and emergency spillways. The emergency spillway is a trapezoidal earth channel on the left abutment with a base width of 165 feet and side slopes of 3 horizontal to 1 vertical. Based on the available head relative to the dam crest, the combined capacity of the primary and emergency spillways is calculated to be 7558 cfs. The spillway rating calculations are included in Appendix D.

5.4 RESERVOIR CAPACITY

The dam impounds a reservoir with a storage capacity of 384 acre-feet at the primary spillway crest level (Elevation 1201.0), 673 acre-feet at the emergency spillway crest level (Elevation 1207.3), and 1,007 acre-feet at the top of the dam (Elevation 1213.0).

5.5 FLOODS OF RECORD

No data available.

5.6 OVERTOPPING POTENTIAL

The PMF inflow hydrograph was determined according to the recommended procedure and was found to have a peak flow of 7100 cfs. The hydrograph was routed through the reservoir and the dam was found to pass full PMF with the reservoir at Elevation 1212.7, which is slightly below the dam crest level at Elevation 1213.0.

5.7 EVALUATION

The spillway can pass the recommended spillway design flood of full PMF without overtopping the embankment; therefore, the spillway capacity is classified to be adequate according to the recommended criteria.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

As discussed in Section 3, the field observations did not reveal any signs of distress that would significantly affect the stability of the dam at this time. However, it should be understood that because the dam is a flood control facility and was at normal low pool level at the time of inspection, it was not under maximum loading conditions which would occur only during the passage of major floods.

b. Design and Construction Data

The dam was designed based on geological and geotechnical studies, which included subsurface investigations, laboratory materials testing and engineering analyses. A SCS memorandum, dated March 10, 1965 and included in Appendix G, summarized the findings and results of the design investigation.

The stability analyses were performed using the Swedish Circle Method. The parameters used were: effective internal friction angle, 31 degrees; effective cohesion, 200 pounds per square foot; saturated and submerged unit weights, 139 and 75 pounds per cubic foot, respectively.

Factors of safety were reported to be 1.49 for the 3 horizontal to 1 vertical upstream slope under rapid drawdown conditions, and 1.59 for the 2.5 horizontal to 1 vertical downstream slope under steady state seepage conditions. The available information was reviewed and found to be adequate.

The calculated factors of safety for this dam are in excess of the minimum factor of safety recommended by the Corps of Engineers. The dam is, therefore, considered to have an adequate safety factor for stability.

c. Postconstruction Changes

None reported.

d. Seismic Stability

The dam is located in Seismic Zone 1. Based on the recommended criteria for evaluation of seismic stability of dams, the structure is presumed to present no hazard from earthquakes.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Visual observations indicate that Nanticoke Creek Watershed Project - Floodwater Retarding Dam Site 7-B is in good condition. No conditions were observed that would significantly affect the overall performance of the structure at this time. However, as previously noted, the dam was not inspected under its maximum loading condition which would occur when the reservoir is filled during major storms.

The spillway capacity was evaluated according to the recommended procedure and was found to pass the required spillway design flood of full PMF without overflowing the embankment; therefore, the spillway capacity is classified to be adequate.

b. Adequacy of Information

Available information, in conjunction with visual observations, is considered to be sufficient to make a Phase I evaluation.

c. Need for Additional Investigations

No additional investigation is considered to be required at this time.

d. Urgency

The action recommended below should be implemented within three months from notification to the owner.

7.2 RECOMMENDATION

1. An emergency action plan should be developed, including a formal warning system to alert the downstream residents in the event of an emergency.

APPENDIX A
PHOTOGRAPHS



PHOTOGRAPH NO. 1
Emergency Spillway (looking downstream)



PHOTOGRAPH NO. 2
Primary Spillway Pipe Impact Basin



PHOTOGRAPH NO. 3
Primary Spillway Concrete Riser



PHOTOGRAPH NO. 4
Memorial School in Maine, New York
(4.5 miles)

APPENDIX B
VISUAL INSPECTION CHECKLIST

APPENDIX B
VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Nanticoke Creek Watershed Project -
Floodwater Retarding Dam Site 7-B

Fed. I.D. # N.Y. 605 DEC Dam No. 85D-3699

River Basin Susquehanna River Basin

Location: Five miles northwest of Maine, in Tioga County

Stream Name Ketchumville Branch Nanticoke Creek

Tributary of Nanticoke Creek

Latitude (N) 42° 15.5' Longitude (W) 76° 54.7'

Type of Dam Earth

Hazard Category High

Date(s) of Inspection March 25, 1981 and June 3, 1981

Weather Conditions Cloudy, Temp. 39 degrees

Reservoir Level at Time of Inspection El. 1180.4 ±

b. Inspection Personnel Lawrence Andersen, P.E.; James Poellot,
P.E.; Bilgin Erel, P.E.; Wah-Tak Chan, P.E.; and Arthur Smith

c. Persons Contacted (Including Address & Phone No.) _____
Mr. Carl S. Young, Broome County Executive, P.O. Box 1766,
Binghamton, N.Y. 13902, (607) 772-2100 and Mr. Gary Page,
Broome County, SCS Office, (607) 773-2751

d. History:

Date Constructed Oct. 1970 Date(s) Reconstructed N/A

Designer USDA Soil Conservation Service

Constructed by _____

Owner Broome County, N.Y.

2) Embankment

a. Characteristics

(1) Embankment Material Earth

(2) Cutoff Type Trapezoidal cutoff trench, 12 feet wide at the base, 6 to 10 feet deep.

(3) Impervious Core Zone 1 of the embankment.

(4) Internal Drainage System A trench drain equipped with 8-inch-diameter perforated pipe.

(5) Miscellaneous --

b. Crest

(1) Vertical Alignment Good (0.6 to 0.1 foot above design dam crest level, El. 1213.0)

(2) Horizontal Alignment Good

(3) Surface Cracks None

(4) Miscellaneous --

c. Upstream Slope

(1) Slope (Estimate) 3H:1V (as designed and as measured)

(2) Undesirable Growth or Debris, Animal Burrows None

(3) Sloughing, Subsidence or Depressions None

(4) Slope Protection Vegetated Slope

(5) Surface Cracks or Movement at Toe None

d. Downstream Slope

(1) Slope (Estimate) 2H:1V (as designed and as measured)

(2) Undesirable Growth or Debris, Animal Burrows None

(3) Sloughing, Subsidence or Depressions None

(4) Surface Cracks or Movement at Toe None

(5) Seepage None

(6) External Drainage System (Ditches, Trenches, Blanket)
None

(7) Condition Around Outlet Structure Good

(8) Seepage Beyond Toe None

e. Abutments - Embankment Contact

No problems observed.

(1) Proximity Contact None

(2) Seepage Along Contact None

3) Drainage System

a. Description of System A trench drain equipped with an
8-inch-diameter perforated pipe.

b. Condition of System Only the downstream end of the pipe
was visible.

c. Discharge from Drainage System 1 gpm \pm (estimated)

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, etc.)

None

5) Reservoir

- a. Slopes Moderate slope, no problems observed.
- b. Sedimentation No problems observed.
- c. Unusual Conditions Which Affect Dam None

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) One school
at the confluence of Nanticoke (4.5 miles downstream from dam).
- b. Seepage, Unusual Growth None
- c. Evidence of Movement Beyond Toe of Dam None
- d. Condition of Downstream Channel Good

7) Spillway(s) (Including Discharge Conveyance Channel)

- a. General Service Spillway: SCS concrete riser discharging
into a 30-inch-diameter reinforced concrete pipe.
Auxiliary Spillway: 165-foot-wide trapezoidal
vegetated earth channel.
- b. Condition of Service Spillway Good

c. Condition of Auxiliary Spillway Good

d. Condition of Discharge Conveyance Channel Good

8) Reservoir Drain/Outlet (Reservoir has no operable drain facility)

Type: Pipe X Conduit _____ Other _____

Material: Concrete _____ Metal _____ Other Cast iron
pipe, Class 1

Size: 16-inch-diameter Length 24 feet

Invert Elevations: Entrance 1174.0 Exit 1173.5 (as built)

Physical Condition (Describe): Not observable.

Material: --

Joints: -- Alignment --

Structural Integrity: --

Hydraulic Capability: --

Means of Control: Gate X Valve _____ Uncontrolled _____

Operation: Operable X Inoperable _____ Other _____

Present Condition (Describe): The reservoir drain pipe
is reported to be operable.

9) Structural

- a. Concrete Surfaces The concrete riser and the concrete outlet structure appears to be in good condition.
- b. Structural Cracking None
- c. Movement - Horizontal & Vertical Alignment (Settlement)
No problems observed.
- d. Junctions with Abutments or Embankments No problems observed.
- e. Drains - Foundation, Joint, Face No problems observed.
- f. Water Passages, Conduits, Sluices N/A
- g. Seepage or Leakage None observed.

h. Maintenance Construction, etc. N/A

i. Foundation No problems observed.

j. Abutments

k. Control Gates Condition unknown.

l. Approach & Outlet Channels Good

m. Energy Dissipators (Plunge Pool, etc.) Good condition.

n. Intake Structures Good

o. Stability N/A

p. Miscellaneous ---

10) Appurtenant Structures (Power House, Lock, Catchment, other)

a. Description and Condition None

APPENDIX C
ENGINEERING DATA CHECKLIST

APPENDIX C
ENGINEERING DATA CHECKLIST
NAME OF DAM: NANTICOKE CREEK WATERSHED PROJECT -
FLOODWATER RETARDING DAM SITE 7-B

AREA-CAPACITY DATA:

	<u>Elevation</u> (feet)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> ⁽¹⁾ (acre-feet)
1) Top of Dam	<u>1213.0</u>	<u>65.4</u>	<u>1007</u>
2) Design High Water (Max. Design Pool)	<u>1212.5</u>	<u>62.6</u>	<u>975</u>
3) Auxiliary Spillway Crest	<u>1207.3</u>	<u>52.5</u>	<u>673</u>
4) Service Spillway Crest	<u>1201.0</u>	<u>39.4</u>	<u>384</u>
5) Crest of Orifice (Normal Pool)	<u>1180.4</u>	<u>4.0</u>	<u>0</u>

(1) Storage capacity below 1180.4 is not included.

DISCHARGES

	<u>Discharge</u> (cfs)
1) Average Daily	<u>6⁺</u>
2) Spillway at Maximum High Water (Top of Dam)	<u>7420</u>
3) Spillway at Design High Water (El. 1212.5)	<u>6456</u>
4) Principal Spillway at Dam Crest Elevation	<u>138</u>
5) Low Level Outlet	<u>Approx. 65</u>
6) Total of All Facilities at Maximum High Water (Top of Dam)	<u>7623</u>
7) Maximum Known Flood	<u>Unknown</u>
8) At Time of Inspection	<u>5⁺</u>

BW: Nantuxke Creek Watershed Project-Floodwater Retarding 1: Site 7:1

CREST ELEVATION: 1213.0

Type: Earth

Width: 15 feet Length: 830 feet

Spillover: Concrete riser and vegetated earth channel.

Location: Concrete riser near the center of the dam, earth channel
on the left abutment.

SPILLWAY:

SERVICE

AUXILIARY

Orifice at 1180.4, weir at 1201 Elevation 1207.3

SCS concrete drop inlet Type 3H:1V trap. vegetated channel

1'10"-wide by 1'7"-high
orifice and 15-foot weir Width 165 feet

Type of Control

Uncontrolled Uncontrolled Uncontrolled

Controlled

N/A Type N/A
(Flashboards; Gate)

N/A Number N/A

N/A Size/Length 300[±] feet

Invert Material Vegetated Earth

Anticipated Length
of Operating Service Unknown

207[±] feet Chute Length N/A

21[±] feet Height Between Spillway Crest
and Approach Channel Invert
(Weir Flow) 7[±] feet

Hydrometeorological Gages:

Type: None

Location: N/A

Records:

Date - N/A

Max. Reading - N/A

FLOODWATER CONTROL SYSTEM:

Warning System: None

Method of Controlled Releases (Mechanisms):

None

DRAINAGE AREA: 3.60 square miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Wood and farmlands

Terrain - Relief: Moderate slope

Surface - Soil: Low permeability soil

Runoff Potential (existing or planned extensive alterations to
existing surface or subsurface conditions)

Moderate to high runoff potential (SCS Hydrological Curve

No. (CN) 75 was used in the original design calculation).

Potential Sedimentation Problem Areas (natural or man-made;
present or future)

None observed.

Potential Backwater Problem Areas for Levels at Maximum Storage
Capacity Including Surge Storage:

None observed.

Dikes - Floodwalls (overflow and nonoverflow) - Low Reaches Along
the Reservoir Perimeter:

Location: None

Elevation: _____

Reservoir:

Length at Maximum Pool: 3,500[±] feet; at normal pool

900[±] feet

Length of Shoreline at Normal Pool: 2,300[±] feet

APPENDIX D

HYDROLOGY AND HYDRAULIC ANALYSES

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

Nanticoke Creek Watershed Project -
NAME OF DAM: Floodwater Retarding Dam Site 7-B (NY DEC 85D-3699)

PROBABLE MAXIMUM PRECIPITATION (PMP) = 22.2 INCHES/24 HOURS⁽¹⁾

STATION	1	2	3	4	5
Station Description	Site 7-B Reservoir	Site 7-B Dam			
Drainage Area (square miles)	3.6	-			
Cumulative Drainage Area (square miles)	3.6	3.6			
Adjustment of PMF for Drainage Area (%)	94% ⁽²⁾				
6 Hours	117	-			
12 Hours	127	-			
24 Hours	136	-			
48 Hours	142	-			
72 Hours	145	-			
Snyder Hydrograph Parameters					
C_p/C_t ⁽³⁾	0.62/1.8	-			
L (miles) ⁽⁴⁾	3.69	-			
L_{ca} (miles) ⁽⁴⁾	1.61	-			
$t_p = C_t(L \cdot L_{ca})^{0.3}$ (hours)	3.07	-			
Spillway Data					
Crest Length (ft)	-	See spillway capacity			
Freeboard (ft)	-	rating			
Discharge Coefficient	-	calculations			
Exponent	-				

⁽¹⁾ Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

⁽²⁾ Hydrometeorological Report 40, U. S. Weather Bureau, 1965.

⁽³⁾ Snyder's Coefficients (C_p and C_t) as recommended by Corps of Engineers, Baltimore District, for Susquehanna River Basin.

⁽⁴⁾ L = Length of longest water course from outlet to basin divide.

L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27		
FLOOD HYDROGRAPH PACKAGE (HEC-1)																												
DAM SAFETY VERSION JULY 1978																												
LAST MODIFICATION 01 APR 80																												

1	A1	SNYDER UNIT HYDROGRAPH, SPILLWAY AND DAM OVERTOPPING ANALYSES																										
2	A2	NANTICOKE 7-B DAM, (NY 85D-3699), TIOGA COUNTY, N.Y. PROJECT NO. 80-778-05																										
3	A3	FOR 20%, 50%, 100%, 200%, 500%, 1000% AND 100% PROBABLE MAXIMUM FLOOD (PMF)																										
4	B	50%	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5	B1	5																										
6	J	1	9																									
7	J1	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00																		
8	K	0	1																									
9	K1	CALC. OF SNYDER INFLOW HYDROGRAPH TO NANTICOKE 7-B DAM, (N.Y. 85D-3699)																										
10	M	1	1	3.60		3.60																						
11	P		20.9	117	127	136	142	145	1.0	0.05																		
12	T		0.62																									
13	M	3.07																										
14	X	-1.5	-0.05	2.0																								
15	K	1	2																									
16	K1	ROUTING FLOW THROUGH NANTICOKE 7-B DAM, (N.Y. 85D-3699)																										
17	Y																											
18	Y1	1																										
19	Y4180.4	1181.0	1182.0	1183.0	1185.0	1190.0	1190.0	1201.0	1202.0	1203.0																		
20	Y41205.0	1207.3	1208.0	1208.5	1209.0	1209.5	1210.0	1211.0	1212.0	1213.0																		
21	Y5 0.0	2.6	11.5	22.5	30.0	43.3	63.4	111.5	120.5	121.2																		
22	Y5 124.8	128.8	431.0	810.5	1286.6	1840.1	2466.8	3926.0	5628.0	7558.0																		
23	SA 4.0	39.4	52.5	58.2	65.4																							
24	SE1180.4	1201.0	1207.3	1210.0	1213.0																							
25	SE1207.3																											

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS								
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
				.20	.30	.40	.50	.60	.70	.80	.90	1.00
HYDROGRAPH AT	1	3.60	1	1420.	2130.	2840.	3550.	4260.	4970.	5680.	6390.	7100.
	(	9.32)	(	40.21)	60.31)	80.42)	100.52)	120.63)	140.73)	160.83)	180.94)	201.04)
ROUTED TO	2	3.60	1	163.	1235.	2245.	3161.	3988.	4773.	5508.	6249.	6960.
	(	9.32)	(	4.62)	34.97)	63.57)	89.51)	112.92)	135.16)	155.96)	176.96)	197.08)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION		INITIAL VALUE 1180.40	SPILLWAY CREST		TOP OF DAM 1213.00	
	STORAGE	OUTFLOW		1207.30	673.		
			0.	129.		1007.	
			0.			7558.	
RATIO OF PMF	MAXIMUM RESERVOIR W.S.-ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.30	1208.95	0.00	762.	1235.	0.00	45.25	0.00
.40	1209.82	0.00	812.	2245.	0.00	44.25	0.00
.50	1210.48	0.00	850.	3161.	0.00	43.50	0.00
.60	1211.04	0.00	884.	3988.	0.00	43.25	0.00
.70	1211.50	0.00	912.	4773.	0.00	43.25	0.00
.80	1211.93	0.00	939.	5508.	0.00	43.00	0.00
.90	1212.32	0.00	964.	6249.	0.00	43.00	0.00
1.00	1212.69	0.00	987.	6960.	0.00	43.00	0.00

OVERTOPPING ANALYSIS SUMMARY

PAGE D4 OF 7

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CONSULTING ENGINEERS, INC.

By WTC Date 6-2-81 Subject NANTICOKE CREEK DAM SITE T-B Sheet No. 1 of 3
Chkd. By YMB Date 6/5/81 HYDRAULIC CALCULATIONS Proj. No. 80-778

SPILLWAY CAPACITY RATING CALCULATIONS

- a) SCS RISER ORIFICE OPENNING 1'-10" WIDTH X 1'-7" HEIGHT @ EL 1180.4
WEIR 7'-6" each side L=15' @ EL 1201.0
- b) EMERGENCY SPILLWAY TRAP CHANNEL, b=165', 3" to 1" SIDE SLOPE @ EL 1207.3

- 1) When Water level EL 1180.4 < h < EL 1201

Weir Flow Thru ORIFICE: $Q_1 = C \cdot L \cdot h^{1.5} = (3.1)(1.83) h^{1.5}$

$$Q_1 = 5.68 h^{1.5} \dots \dots \dots \text{EQ - 1}$$

ORIFICE FLOW THRU ORIFICE

$$Q_2 = C \cdot A \sqrt{2gh} = (0.6)(1.83 \times 1.58)(\sqrt{64.4}) \sqrt{h}$$

$$Q_2 = 13.98 \sqrt{h} \dots \dots \dots \text{EQ - 2}$$

- 2) When Water level ABOVE EL 1201 < H < 1207.3 ADDED CAPACITY

Weir Flow Thru RISER

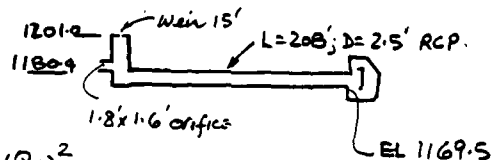
$$Q_3 = (3.1)(15)(H)^{1.5}$$

$$Q_3 = 46.5 H^{1.5} \dots \dots \dots \text{EQ - 3}$$

PIPE FLOW (P. 567, Design of small dam)

$$H_T = \left[\frac{2.524(H_{ke})}{D^4} + \frac{466.18 \pi^2 L^7}{D^{14/3}} \right] \left(\frac{Q_4}{10} \right)^2$$

$$= \left[\frac{(2.524)(1.9)}{(2.5)^4} + \frac{(466.18)(0.012)^7 (208)}{(2.5)^{14/3}} \right] \left(\frac{Q_4}{10} \right)^2$$



$$Q_4 = 20.95 \sqrt{H_T} \dots \dots \dots \text{EQ - 4}$$

- 3) When Water level ABOVE EL 1207.3 ADD EMERGENCY SPILLWAY CAPACITY

REF. P. 553 DESIGN of small dam

$$V_c = \frac{b + Z d_c}{b + 2 Z d_c} d_c g \dots \dots \dots \text{EQ - 5}$$

$$H_e = d_c + \frac{V_c^2}{2g} = d_c + \frac{b + Z d_c}{b + 2 Z d_c} (d_c g) \left(\frac{1}{2g} \right)$$

$$= \frac{(3b + 5 Z d_c) d_c}{2b + 4 Z d_c}$$

$$d_c = \frac{-(3b - 4 H_e Z) + \sqrt{(3b - 4 H_e Z)^2 + (4 H_e Z)(10b)}}{10 Z} \dots \dots \dots \text{EQ - 6}$$

$$A_c = (Z d_c + b) d_c \dots \dots \dots \text{EQ - 7}$$

$$Q_5 = Q_c = (A_c)(V_c) \dots \dots \dots \text{EQ - 8}$$

D'APPOLONIA

CONSULTING ENGINEERS, INC.

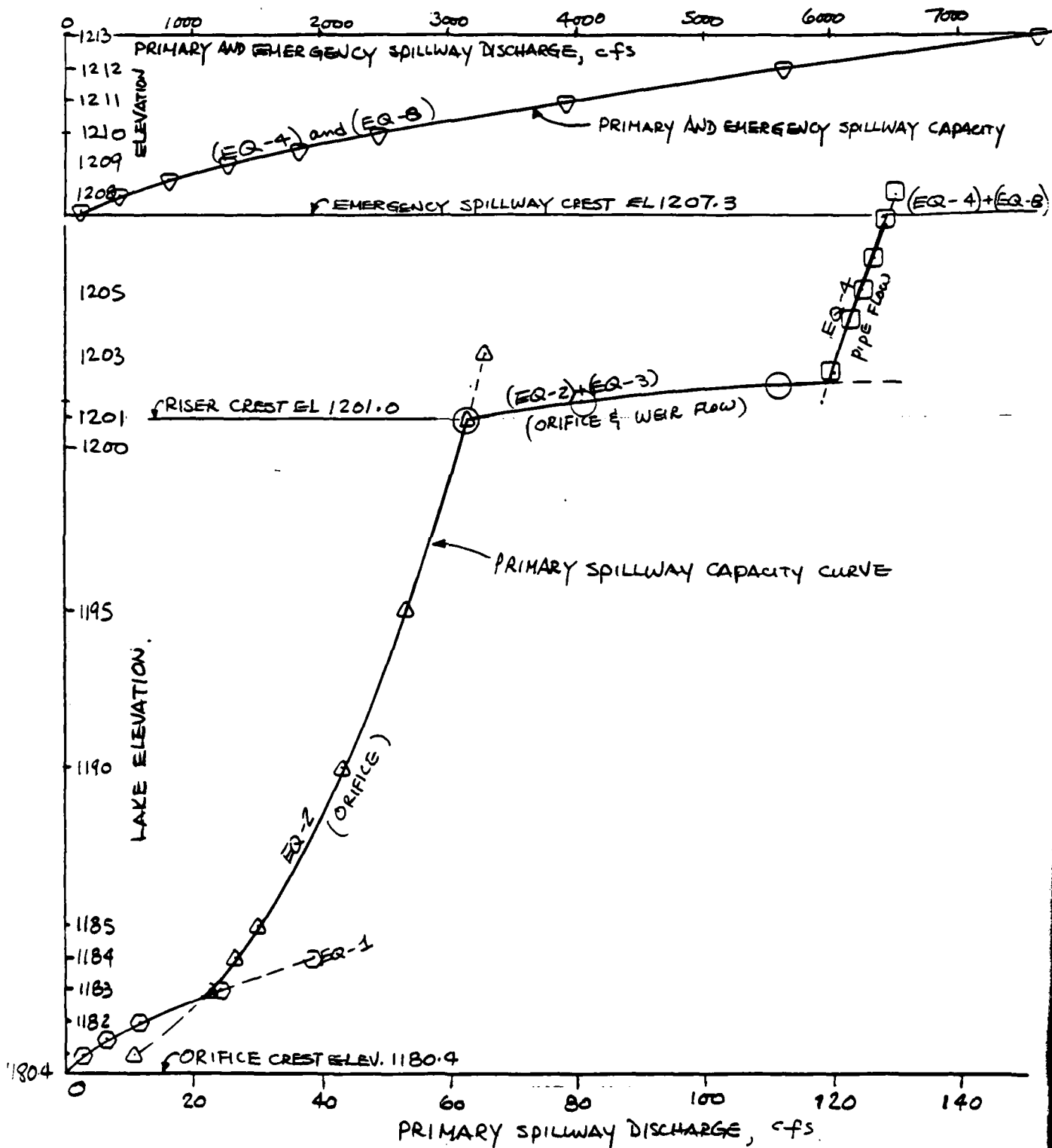
By WTC Date 6-2-81 Subject NANTICOKE CREEK DAMSITE 7-B Sheet No. 2 of 3
 Chkd. By MB Date 6/5/81 HYDRAULIC CALCULATIONS Proj. No. 80-778

LAKE ELEVATION (USGS)	PRIMARY SPILLWAY				PRIMARY SPILLWAY CAPACITY, Q_p $Q_1 + Q_2 + Q_3 + Q_4$	EMERGENCY SPILLWAY			EM. SPILL. CAPACITY EQ-8 $Q_5 = Q_c$	COMBINED SPILLWAY CAPACITY $Q_p + Q_5$
	ORIFICE		RISER			EQ-6	EQ-7	EQ-5		
	EQ-1	EQ-2	EQ-3	EQ-4						
	Q_1	Q_2	Q_3	Q_4							$d_c$	$A_c$	$V_c$
FT	cfs	cfs	cfs	cfs	cfs	FT	FT ²	fps	cfs	cfs
1180.4	0				0					0
1181	2.6	10.8			2.6					2.6
1181.5	6.6	14.7			6.6					6.6
1182	11.5	17.7			11.5					11.5
1183	23.8	22.5			22.5					22.5
1184	38.8	26.5			26.5					26.5
1185		30.0			30.0					30.0
1190		43.3			43.3					43.3
1195		53.4			53.4					53.4
1201		63.4	0		63.4					63.4
1201.5		64.2	16.4	118.5	80.6					80.6
1202		65.0	46.5	119.4	111.5					111.5
1202.5		65.7	85.4	120.3	120.3					120.3
1203		66.4	131.5	121.2	121.2					121.2
1204				123.0	123.0					123.0
1205				124.8	124.8					124.8
1206				126.5	126.5					126.5
1207.3				128.8	128.8	0	0	0	0	128.8
1208				130.0	130.0	0.5	77.9	3.9	301.0	431.0
1208.5				130.8	130.8	0.8	134.6	5.1	679.7	810.5
1209				131.6	131.6	1.1	192.2	6.0	1153.0	1284.6
1209.5				132.5	132.5	1.5	250.6	6.8	1707.6	1840.1
1210				133.3	133.3	1.8	310.0	7.5	2335.5	2468.8
1211				134.9	134.9	2.5	431.5	8.8	3791.1	3926.0
1212				136.5	136.5	3.2	556.6	9.9	5491.5	5628.0
1213				138.1	138.1	3.9	685.4	10.8	7419.9	7558.0

D'APPOLONIA

CONSULTING ENGINEERS, INC.

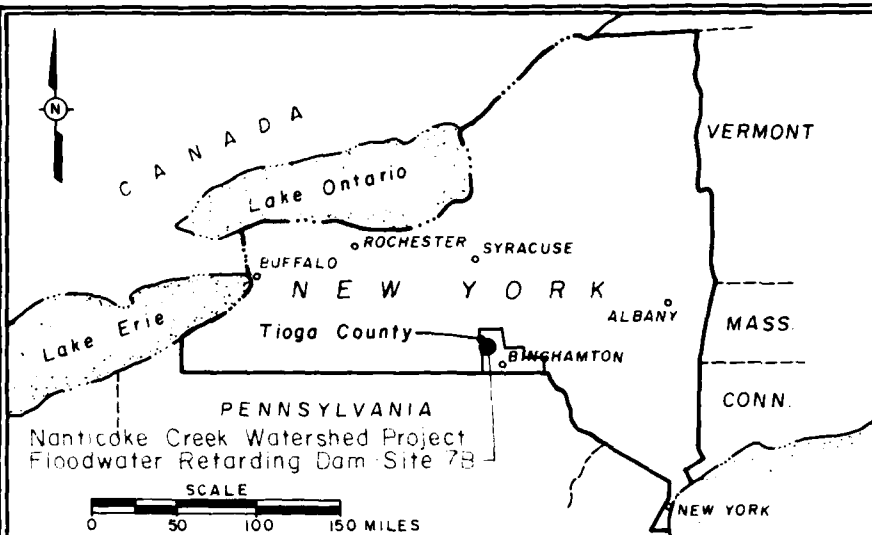
By WTC Date 6-2-81 Subject NANTICOKE CREEK DAM SITE 7-B Sheet No. 3 of 3
 Chkd. By MBS Date 6/5/81 HYDRAULIC CALCULATIONS Proj. No. 80-778



APPENDIX E

PLATES

DRAWN BY
 A.C.S.
 6-8-81
 CHECKED BY
 JHP
 6/16/87
 APPROVED BY
 JHP
 6/16/87
 DRAWING 80-778-B19
 NUMBER



KEY PLAN

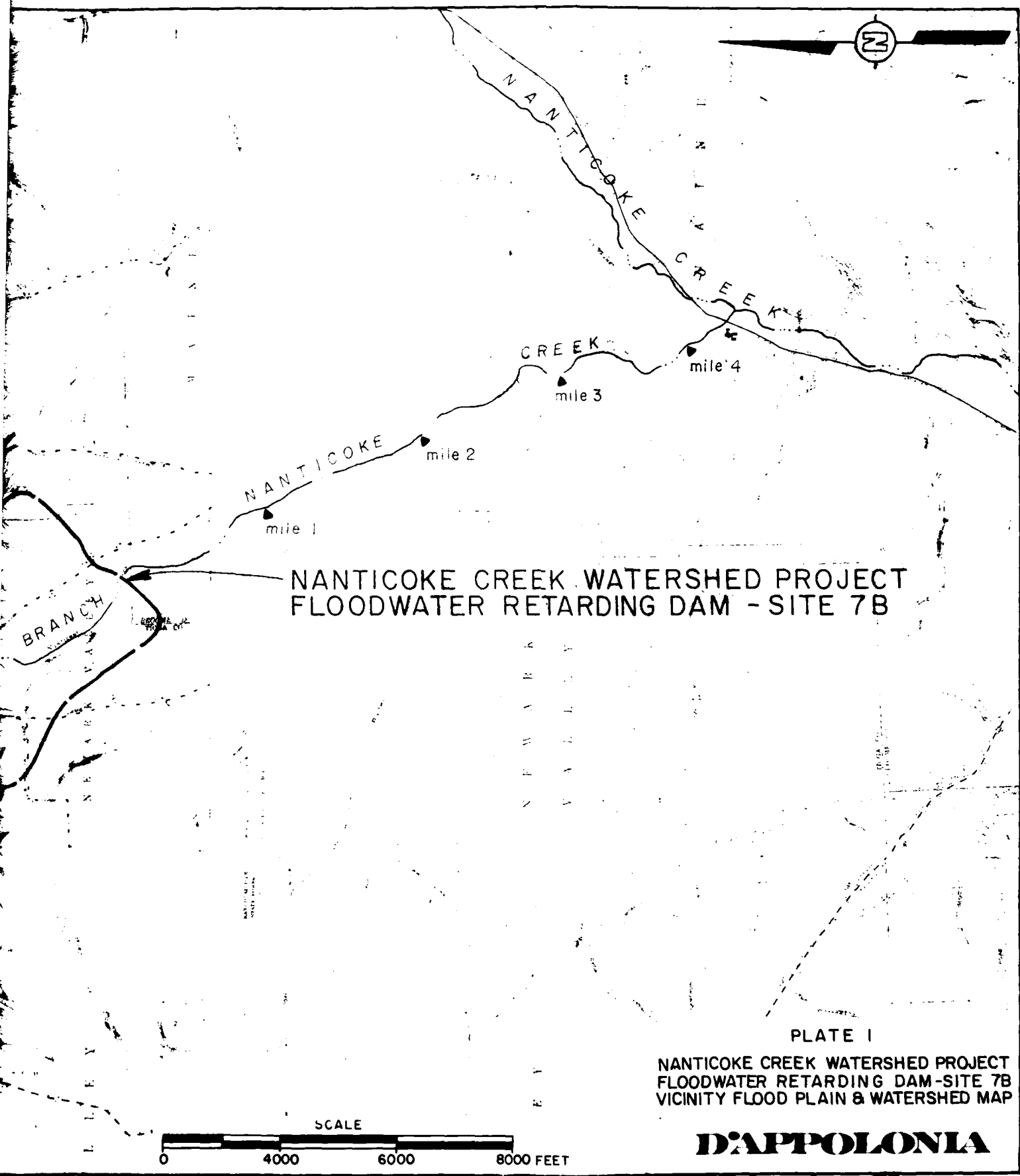
APPROXIMATE
WATERSHED AREA

KETCHUMVILLE

BRANCH

REFERENCES:

- U.S.G.S. NEWARK VALLEY, N.Y. QUADRANGLE
DATED: 1969, SCALE 1:24000
- U.S.G.S. MAINE, N.Y. QUADRANGLE
DATED: 1969, SCALE 1:24000
- 7.5 MIN. U.S.G.S. RICHFORD, N.Y. QUADRANGLE
DATED 1950, SCALE 1:24000
- 7.5 MIN. U.S.G.S. LISLE, N.Y. QUADRANGLE
DATED: 1949, PHOTOREVISED: 1976, SCALE 1:24000



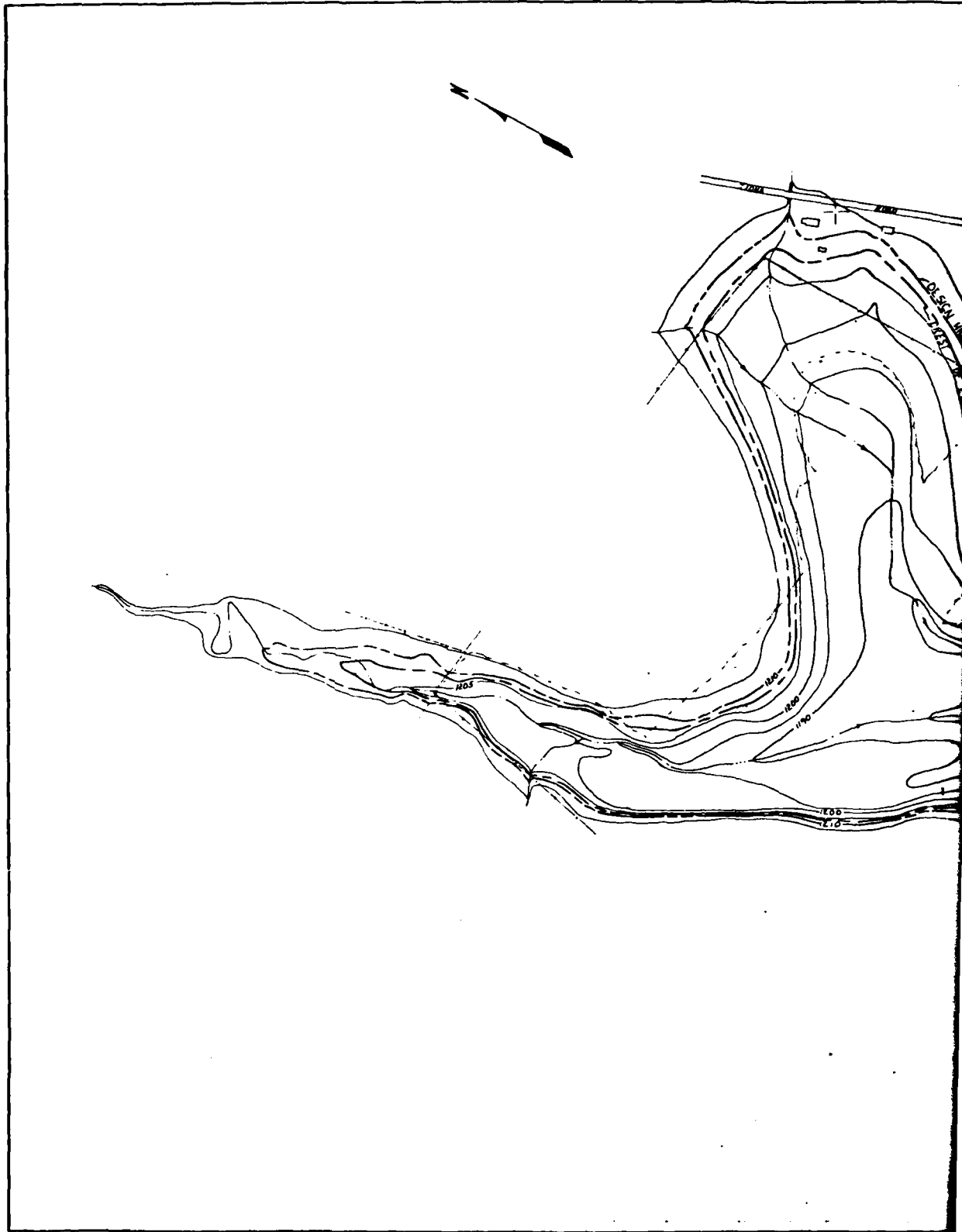
NANTICOKE CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM - SITE 7B

PLATE I

NANTICOKE CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM-SITE 7B
VICINITY FLOOD PLAIN & WATERSHED MAP

D'APPOLONIA

DRAWN BY	G.J.G.	CHECKED BY	6/12/81	DRAWING 80-778-B20 NUMBER
	5-27-81	APPROVED BY	6/16/81	



AS BUILT
Oct. 30, 1970

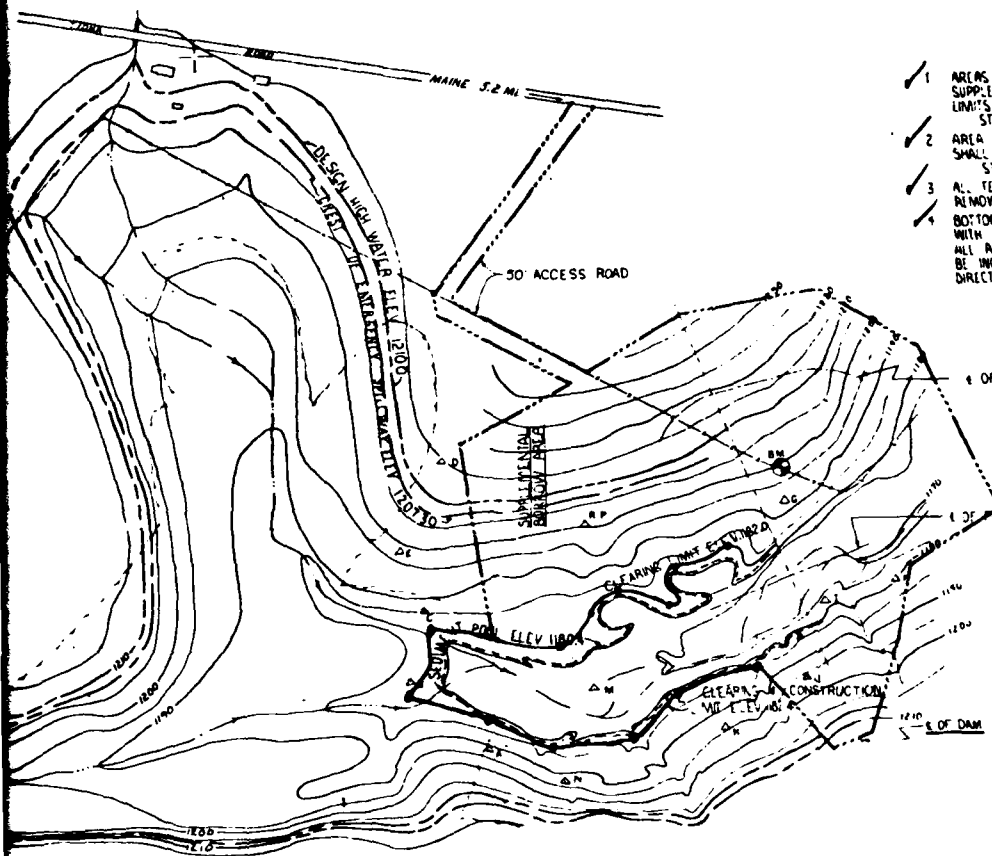
LEGEND

- DESIGN HIGH WATER
- - - CREST OF EMERGENCY SPILLWAY
- - - SEDIMENT POOL
- - - E OF STREAM
- - - CONTOUR LINES
- BENCH MARK
- △ TRAVEL STATIONS
- - - FENCE LINE (EXISTING)
- BUILDINGS
- - - PAVED ROAD
- - - CONSTRUCTION LIMIT
- - - CLEARING LIMIT
- - - - AS BUILT

CONSTRUCTION DETAILS

- 1 AREAS UNDER THE DAM LEVEE, EMERGENCY SPILLWAY AND SUPPLEMENTAL BORROW AREA TO BE CLEARED AND GRUBBED LIMITS OF AREA TO BE CLEARED AND GRUBBED SHALL BE STAKED IN THE FIELD BY THE ENGINEER
- 2 AREA UPSTREAM FROM DAM AND BELOW ELEVATION 1182.4 SHALL BE CLEARED LIMITS OF AREA TO BE CLEARED SHALL BE STAKED IN THE FIELD BY THE ENGINEER
- 3 ALL FENCES IN WORK AREA TO BE REMOVED AS STRUCTURAL REMOVAL
- 4 BOTTOM SECTION OF EMERGENCY SPILLWAY TO BE COVERED WITH 6" OF TOPSOIL FROM STA 3+50 TO APPROX STA 1+50 ALL ADDITIONAL TOPSOIL THAT IS SUITABLE FOR USE WILL BE INCORPORATED WITHIN THE SLOPES OF THE EARTH FIL. AS DIRECTED BY THE ENGINEER

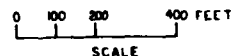
Topsoil QUANTITY PAID = 7,150 SQ YDS.



SOILS DETAILS

SEE SHEET 17 & 18 FOR DESCRIPTIONS OF DRILL HOLES AND TEST PITS SHOWN ON SHEETS 3 & 5 & 7 & 8

5' CONTOUR INTERVAL



**NANTICOKE CREEK WATERSHED PROJECT
SITE 7-B
FLOODWATER RETARDING DAM
TIOGA COUNTY, NEW YORK
PLAN OF STORAGE AREA**

**U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE**

Designed by D. ZOGRAFOS	Date 7/67	Approved by B. FELTON
Drawn by B. FELTON	Title NY-2005-P	
Traced by B. J. G.	Sheet 2	Drawing No. NY-2005-P

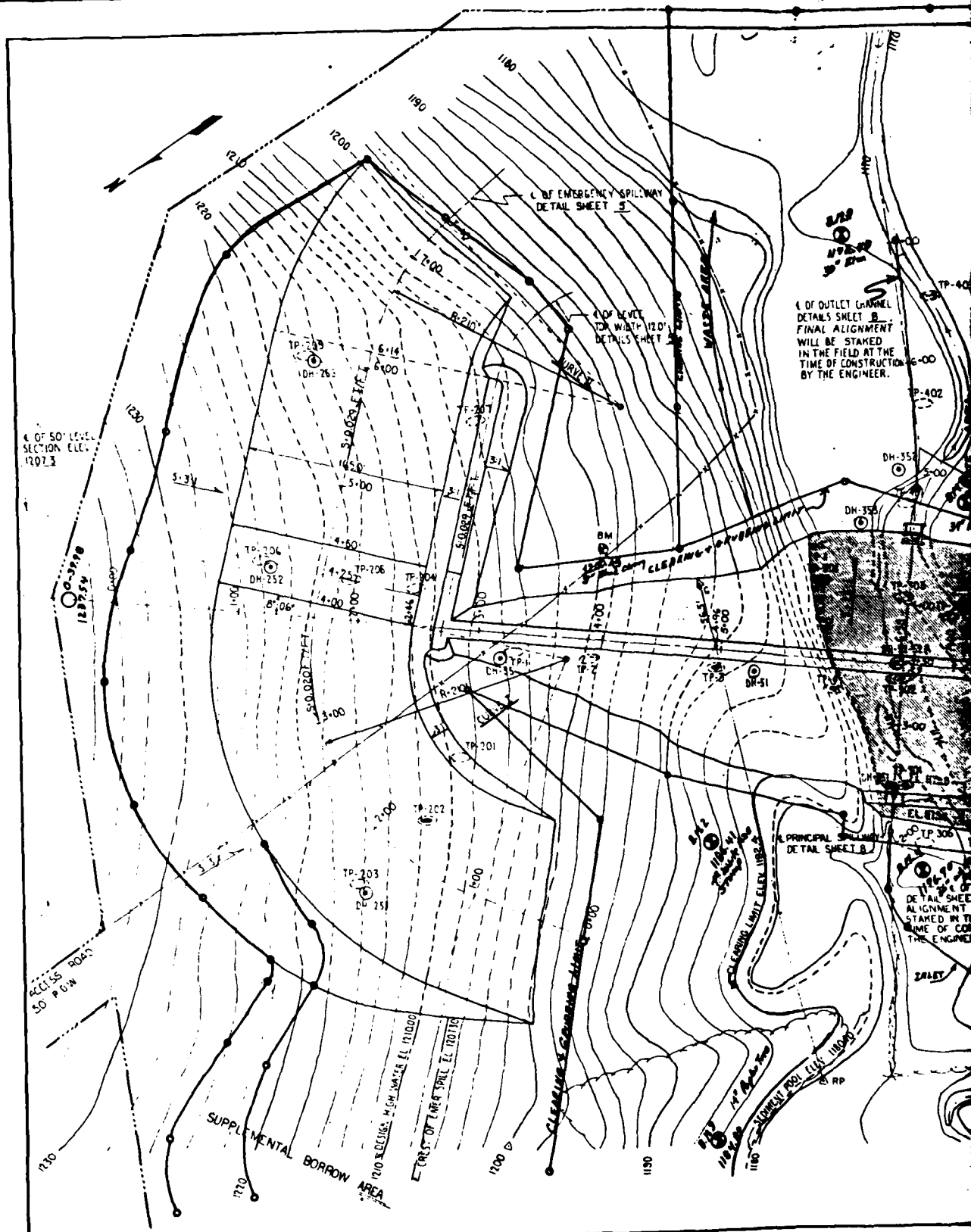
PLATE 2

D'APPOLONIA

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2

DRAWN BY



FOUNDATION EXCAVATION DETAILS
 REMOVE MATERIALS C, E, F & G FROM
 THE BASE WIDTH OF THE DAM IN THE
 FLOOD PLAIN. SEE SHEETS 17 & 18 FOR
 DESCRIPTIONS OF MATERIALS.
FOUNDATION EXCAVATION EXTENDED
 150' UP & 115' DOWN.

AS BUILT
 OCT 30, 1970

LEGEND

- DESIGN HIGH WATER
- CREST OF EMERGENCY SPILLWAY
- SEDIMENT POOL
- E. OF STREAM
- CONTOUR LINES
- BENCH MARK
- TRAVEL STATIONS
- DRILL HOLES
- TEST PIT (LOGGED & SAMPLED)
- TEST PIT (LOGGED ONLY)
- WOODS LINE
- FENCE LINE (EXISTING)
- CONSTRUCTION LIMIT
- FOUNDATION EXCAVATION
- CLEARING LIMIT

TYPICAL SECTION OF WATERWAY
 WATERWAY WAS NOT
 CONSTRUCTED.

CURVE DATA

LAYOUT DATA FOR CURVE 1

Δ: 6° 51' T: 182.01'
 R: 210' L: 67.94'
 D: 27° 11' M: 51.33'
 L: 300'

STATION	DEFLECTION	CHORD DIST
4+00	0° 00'	0.0
3+50	6° 49'	45.88
3+00	13° 36'	...
2+50	20° 26'	...
2+00	27° 11'	...
1+50	34° 06'	...
1+00	40° 53'	...

LAYOUT DATA FOR CURVE 2

Δ: 34° 23' T: 64.96'
 R: 210' L: 9.82'
 D: 27° 11' M: 5.38'
 L: 126'

STATION	DEFLECTION	CHORD DIST
6+00	0° 00'	0.0
6+55	5° 25'	25.0'
6+04	6° 49'	...
6+09	10° 14'	...
7+14	24° 19'	...
7+40	34° 11.5'	25.0'

BENCH MARK DESCRIPTION
 NAIL IN PRIMER CASING IN
 STUMP OF CHERRY - 6' EAST
 OF FENCE ELEV. 1200.45

0 20 40 60 80
 SCALE IN FEET
 2" CONT. = 100' HORIZONTAL

NANTICOKE CREEK WATERSHED PROJECT
SITE 7-B
FLOODWATER RETARDING DAM
TIOGA COUNTY, NEW YORK
PLAN OF STRUCTURAL WORKS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed: D. ZOGRAFOS Date: 7/65
 Drawn: W. YOLTON 10/66
 Checked: J. SHERILL 7/66
 Title: 10/66

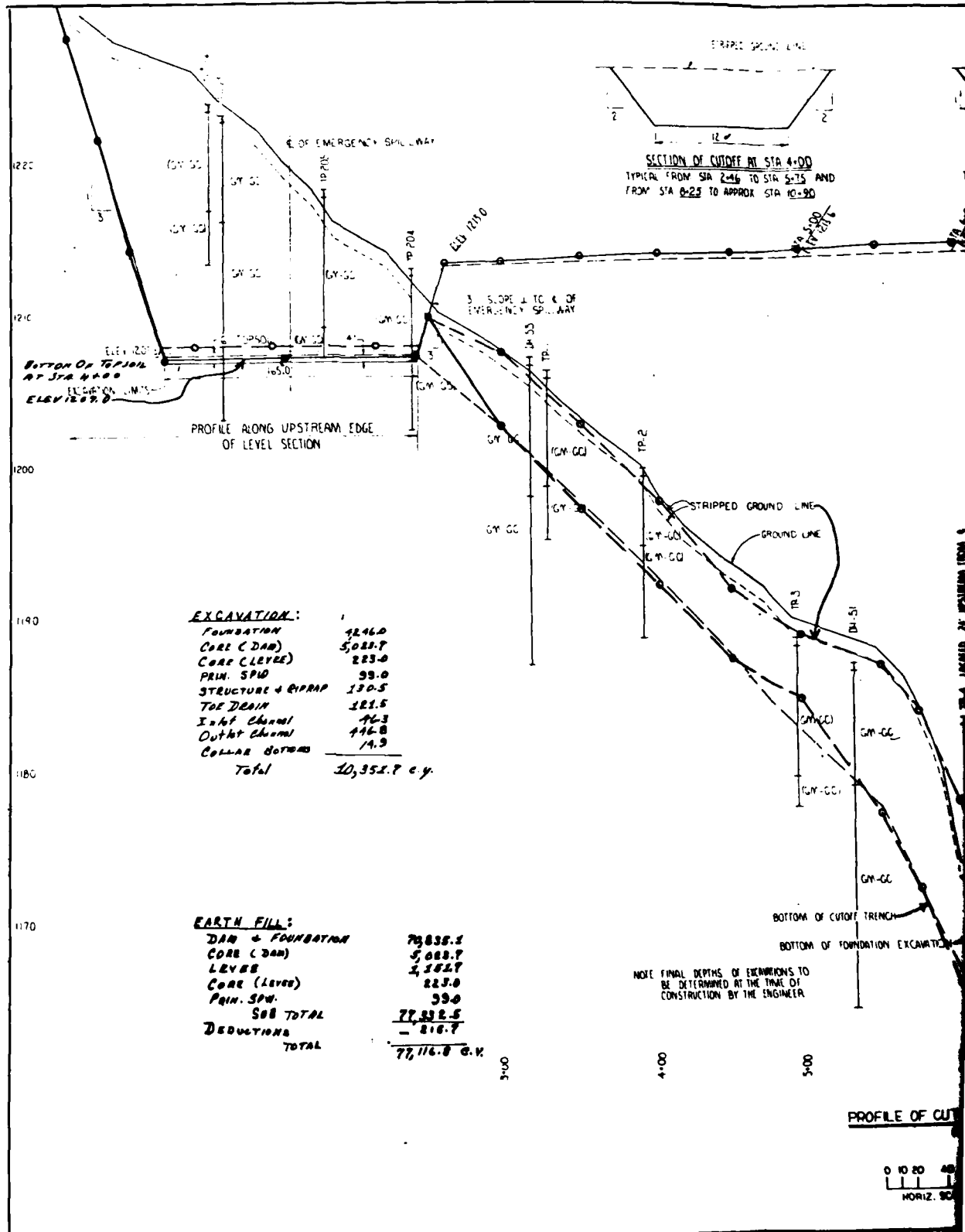
Approved by: _____
 Date: _____
 Project No: 10/66
 Drawing No: NY-2005-P

PLATE 3

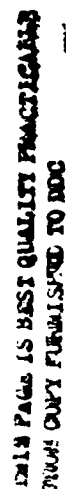
D'APPOLONIA

THIS PAGE IS BEST QUALITY PRACTICE
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 5-27-81 APPROVED BY J. H. G. 6/16/81

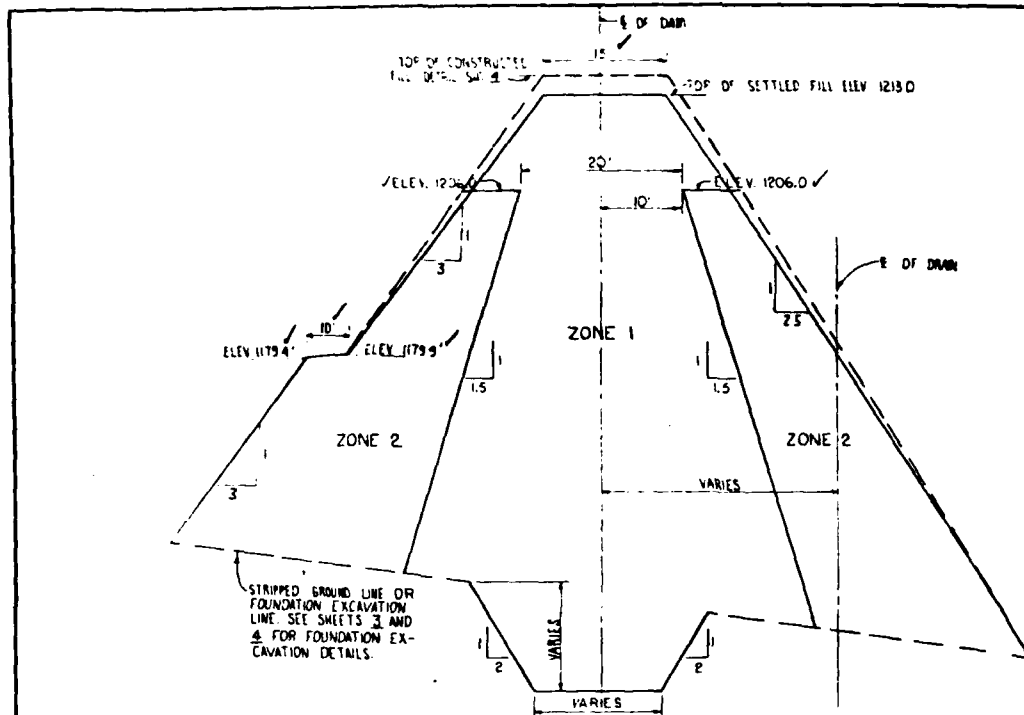


OCT. 30, 1970

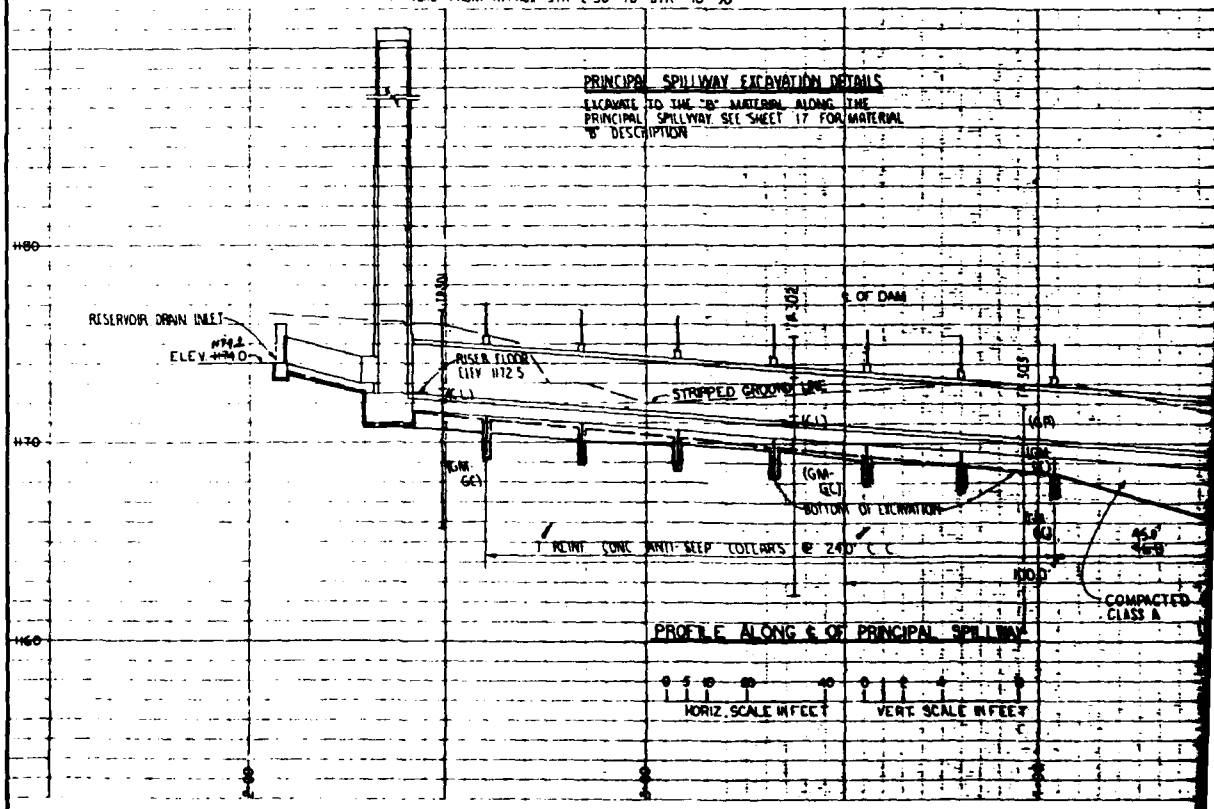


D'APPOLONIA

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 5-27-81 APPROVED BY JHD 6/16/81 NUMBER



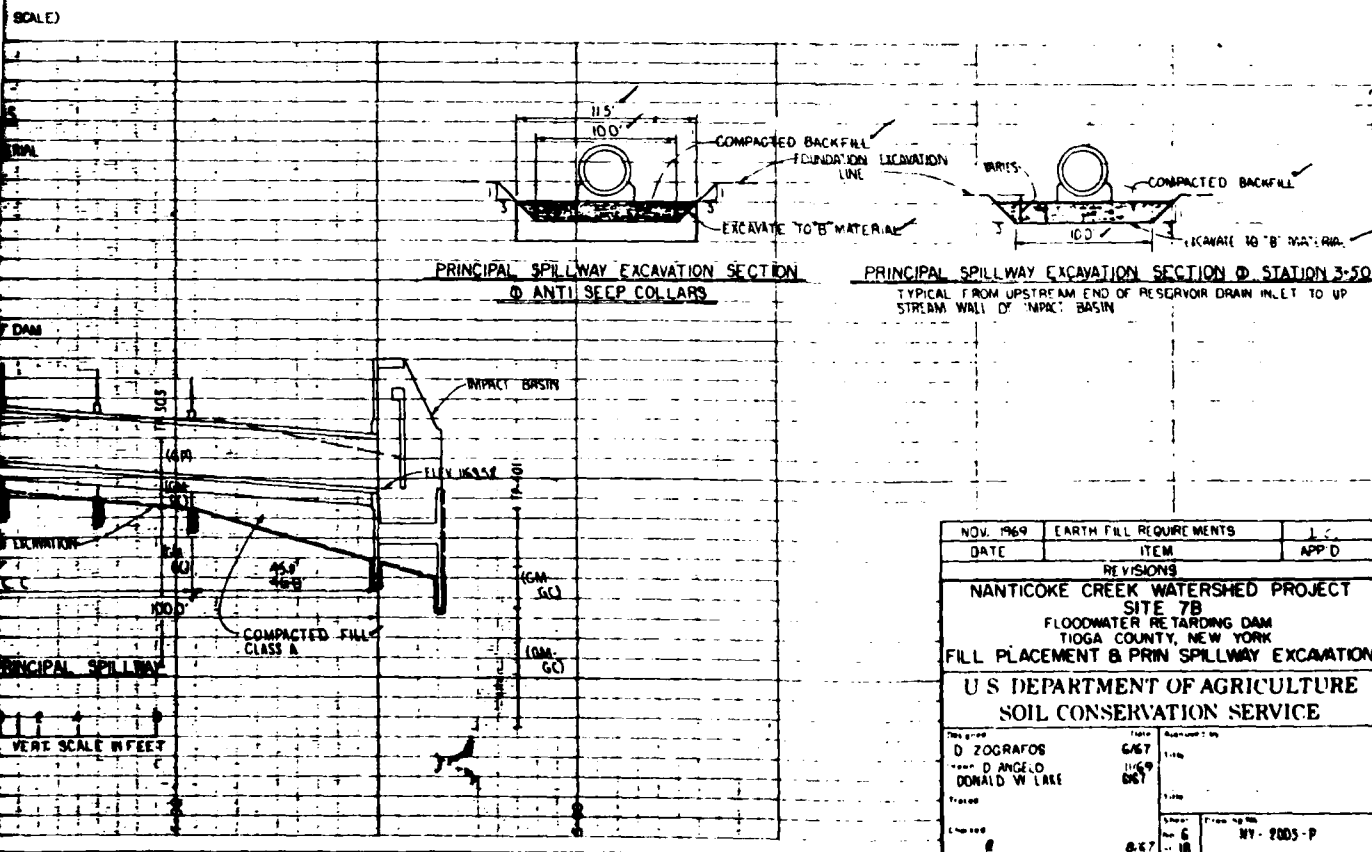
SECTION OF DAM AT STATION 7+00
 TYPICAL FROM APPROX STA 2+50 TO STA 10+90 (NOT TO SCALE)



EARTH FILL REQUIREMENTS						
ZONE	MATERIAL 1/	MAX. ROCK SIZE 2/	MAX. LIFT THICK 3/	REQUIRED WATER CONTENT 4/	COMPACTION 5	
					CLASS	DEFINITION
1	MATERIAL "A" AND "B" AS LABELLED ON SHEET 17 AND REPRESENTED BY: TP 202 FROM 0.5' TO 13.3' TP 206 FROM 0.5' TO 10.5' TP 209 FROM 0.5' TO 11.5'	6"	9"	2 PERCENTAGE POINTS BELOW TO 2 PERCENTAGE POINTS ABOVE OPTIMUM	A	98 % MAXIMUM DENSITY BY ASTM D698 METHOD C.
2	REPRESENTED BY MATERIAL IN ZONE 1 PLUS OVERSIZE MATERIAL REMOVED FROM ZONE 1	16"	24"	6/	V	SEE CONSTRUCTION SPECIFICATION 5

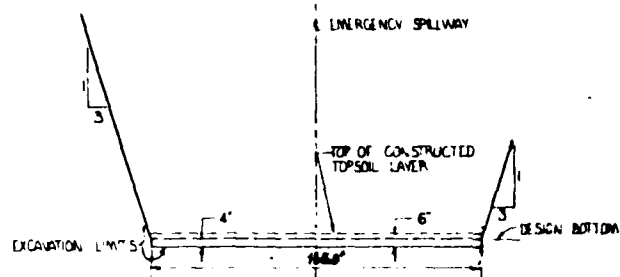
- ## CONSTRUCTION DETAILS

1. THE FOUNDATION SURFACE THROUGHOUT THE BASE AREA OF THE DAM SHALL BE SCARIFIED TO A DEPTH OF 6 INCHES AND COMPACTED PRIOR TO PLACEMENT OF EARTH FILL..
2. TOP SOIL THAT IS SUITABLE FOR USE AND NOT USED ON THE SPECIFIED AREA OF THE EMERGENCY SPILLWAY SHALL BE INCORPORATED WITHIN THE SLOPES OF THE EARTH FILL AS DIRECTED BY THE ENGINEER.
3. ZONE BOUNDARIES INDICATED ARE APPROXIMATE. ADJUSTMENTS WILL BE MADE BY THE ENGINEER TO PERMIT THE CONTRACTOR TO UTILIZE ALL USABLE REQUIRED EXCAVATION WITHIN THE NEAT LINES OF THE EMBANKMENT.



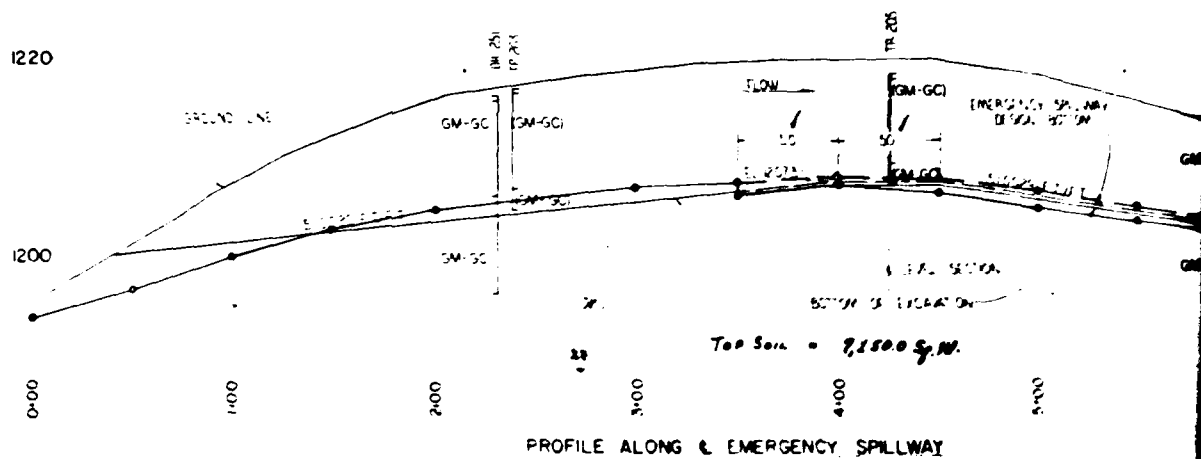
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DRAWN BY G.J.G. CHECKED BY BE 6/16/81 DRAWING 80-778-B 24
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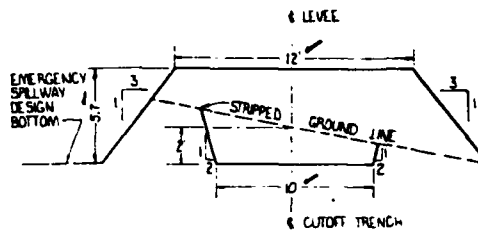
SECTION OF EMERGENCY SPILLWAY AT STATION 4+25

TYPICAL FROM STATION 3+50 TO APPROX STATION 7+50
 EXCAVATION LIMITS TO DESIGN BOTTOM FROM APPROX
 STA 3+20 TO STA 3+50



CHECKED BY G.J.G.
 DATE 6/16/81
 SCALE FOR ALL

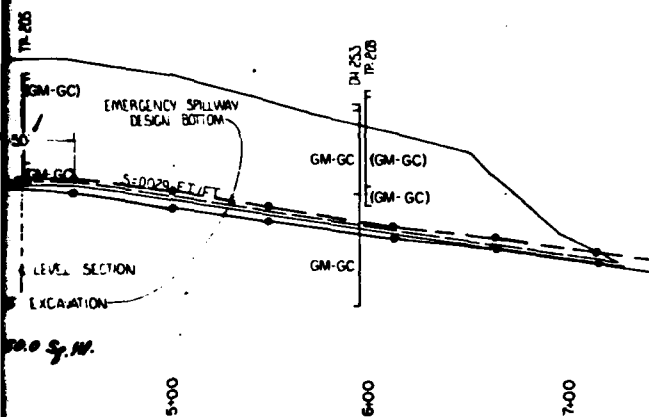
AS BUILT
OCT. 30, 1970



SECTION OF LEVEE AT 6 OF LEVEL SECTION

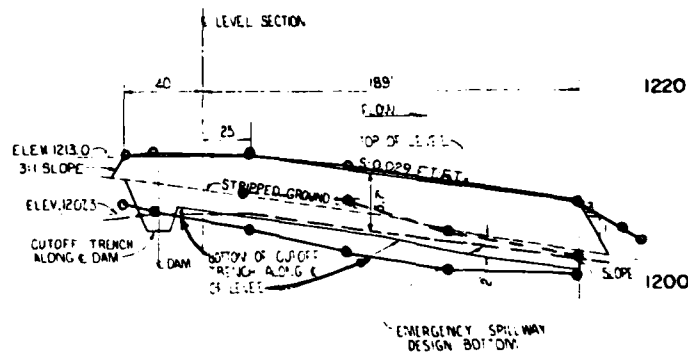
TYPICAL FROM 40.0' UPSTREAM TO 189.0' DOWNSTREAM
FROM 6 OF LEVEL SECTION

DESIGN BOTTOM

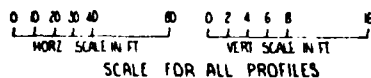


EXCAVATION

SPILLWAY



PROFILE ALONG 6 OF LEVEE



NANTICOKE CREEK WATERSHED PROJECT
SITE 7-B
FLOODWATER RETARDING DAM
TIOGA COUNTY, NEW YORK
EMERGENCY SPILLWAY

D ZOGRAFOS 7-67
B FELTON

66' 5" NY-2005-P

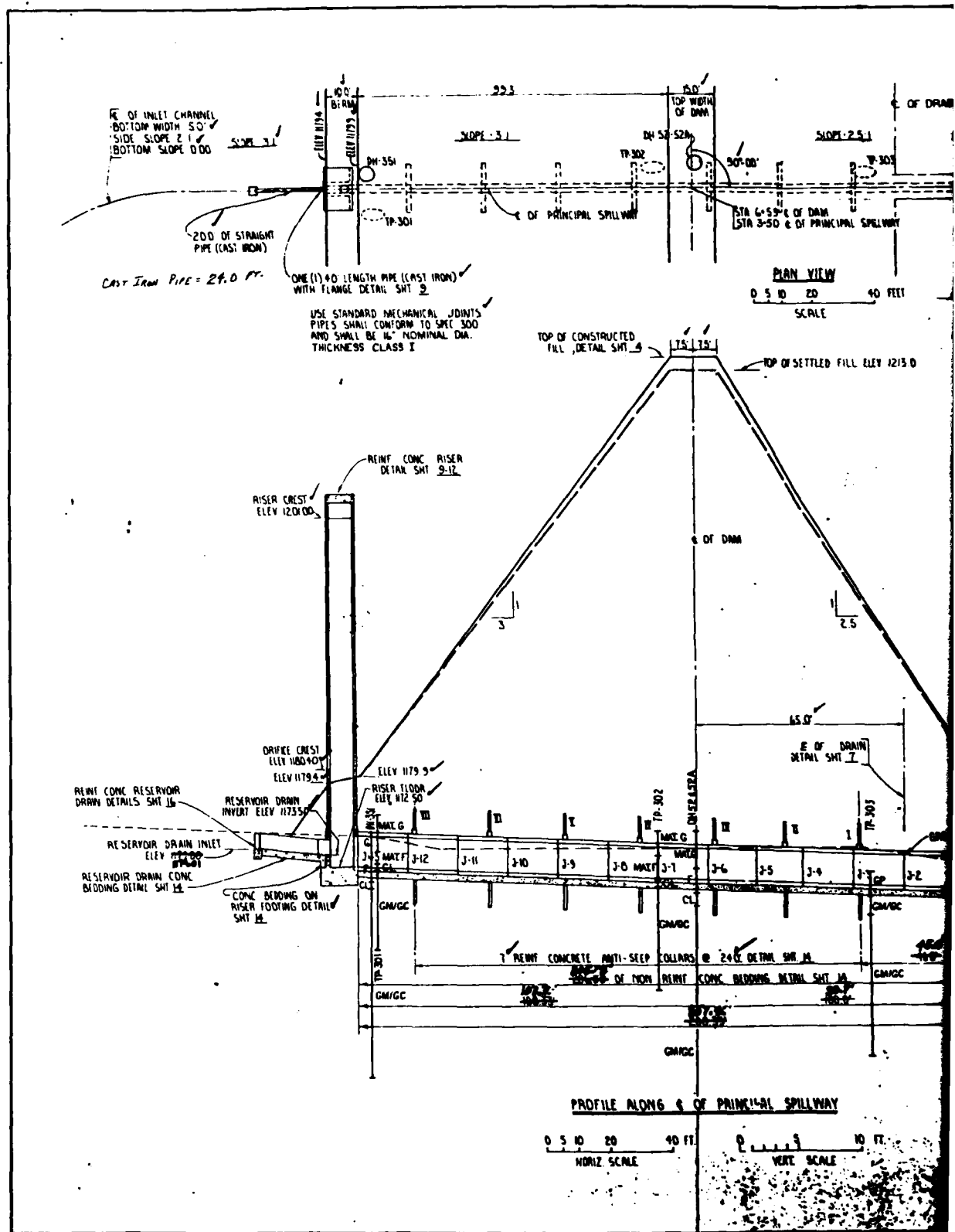
PLATE 6

D'APPOLONIA

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	5-26-81	APPROVED BY	JHO	6/16/81	



AS BUILT
OCT. 30, 1970

INVERT SET	JOINT	DIST FROM OUTLET	INVERT OF 30" DIA PIPE	S.O.M.
69.57	OUTLET	0	69.50	0.0050
69.57	J-1	16	69.50	
69.57	J-2	32	69.50	
69.57	J-3	48	69.50	
69.57	J-4	64	69.50	
69.57	J-5	80	69.50	
69.57	J-6	96	69.50	0.01958
69.57	J-7	112	69.50	0.0100
69.57	J-8	128	69.50	
69.57	J-9	144	69.50	
69.57	J-10	160	69.50	
69.57	J-11	176	69.50	
69.57	J-12	192	69.50	
69.57	J-13	208	69.50	0.0100

ABOVE DIMENSIONS FOR LENGTHS OF PIPE ARE BASED ON NOMINAL LENGTHS AND DO NOT INCLUDE CREEL

COLLAR	DIST FROM OUTLET	INVERT OF 30" DIA PIPE
I	45	69.50
II	69	69.50
III	93	69.50
IV	117	69.50
V	141	69.50
VI	165	69.50
VII	189	69.50

**30" REINFORCED CONCRETE PIPE
STRENGTH REQUIREMENTS**

1. PRESSURE HEAD 30'
2. LOAD 35,000 LBS PER LIN FT BASED ON O.D. OF 3.11'
3. MIN 3 EDGE BEARING STRENGTH FOR 0.001 CRACK-13,000 LBS PER LIN FT FOR PRE-STRESSED PIPE (ANMA C-501)

WHERE THE PIPE FURNISHED HAS AN OUTSIDE DIAMETER GREATER THAN THAT CALLED FOR ON THE PLANS, THREE EDGE BEARING STRENGTH OF THE PIPE FURNISHED MUST BE EQUAL TO OR GREATER THAN THE SPECIFIED THREE EDGE BEARING STRENGTH MULTIPLIED BY THE RATIO OF THE OUTSIDE DIAMETER OF THE PIPE FURNISHED TO THE OUTSIDE DIAMETER SPECIFIED.

FABRICATION INSTRUCTIONS

(3) 160' SECTIONS ONE (1) SPIGOT RING WALL FITTING FOR 15" WALL	OR	(10) 200' SECTIONS (1) 80' SECTION ONE (1) SPIGOT RING WALL FITTING FOR 15" WALL
PIPE SUPPLIERS NOTE CAST OUTSIDE OF SPIGOT RING WITH CONCRETE ON ONE 160' SECTION		PIPE SUPPLIERS NOTE CAST OUTSIDE OF SPIGOT RING WITH CONCRETE ON ONE 200' SECTION

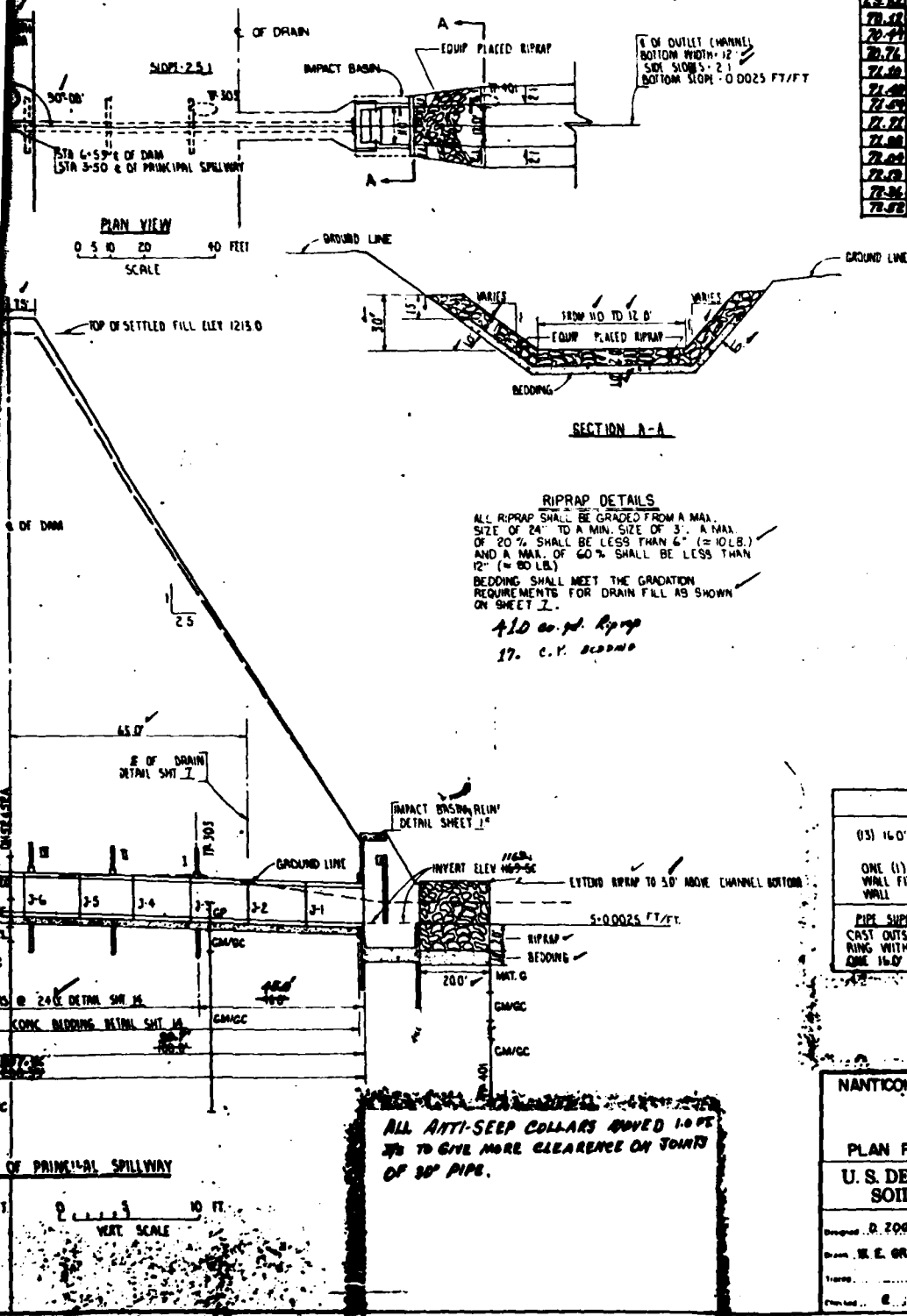
WHEN PIPE IS SUPPLIED IN 200' LENGTHS THE ENGINEER WILL PROVIDE THE CONTRACTOR WITH A REVISION OF SHEET 8 SHOWING ORDER OF INSTALLATION AND PIPE INVERT ELEVATIONS

**NANTICOKE CREEK WATERSHED PROJECT
SITE 78
FLOODWATER RETARDING DAM
TOGA COUNTY, NEW YORK
PLAN PROFILE OF PRINCIPAL SPILLWAY
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE**

Designed by **D. ZOGRAFOS** Date **8/67**
 Drawn by **M. E. GRAND JR.** Date **8/67**
 Title **PREPARED FOR**
 Project **BT-7005-P**

PLATE 7

D'APPOLONIA



RIPRAP DETAILS
ALL RIPRAP SHALL BE GRADED FROM A MAX. SIZE OF 24" TO A MIN. SIZE OF 3". A MAX. OF 20% SHALL BE LESS THAN 6" (= 10 LB.) AND A MAX. OF 60% SHALL BE LESS THAN 12" (= 80 LB.)
BEDDING SHALL MEET THE GRADATION REQUIREMENTS FOR DRAIN FILL AS SHOWN ON SHEET 7.

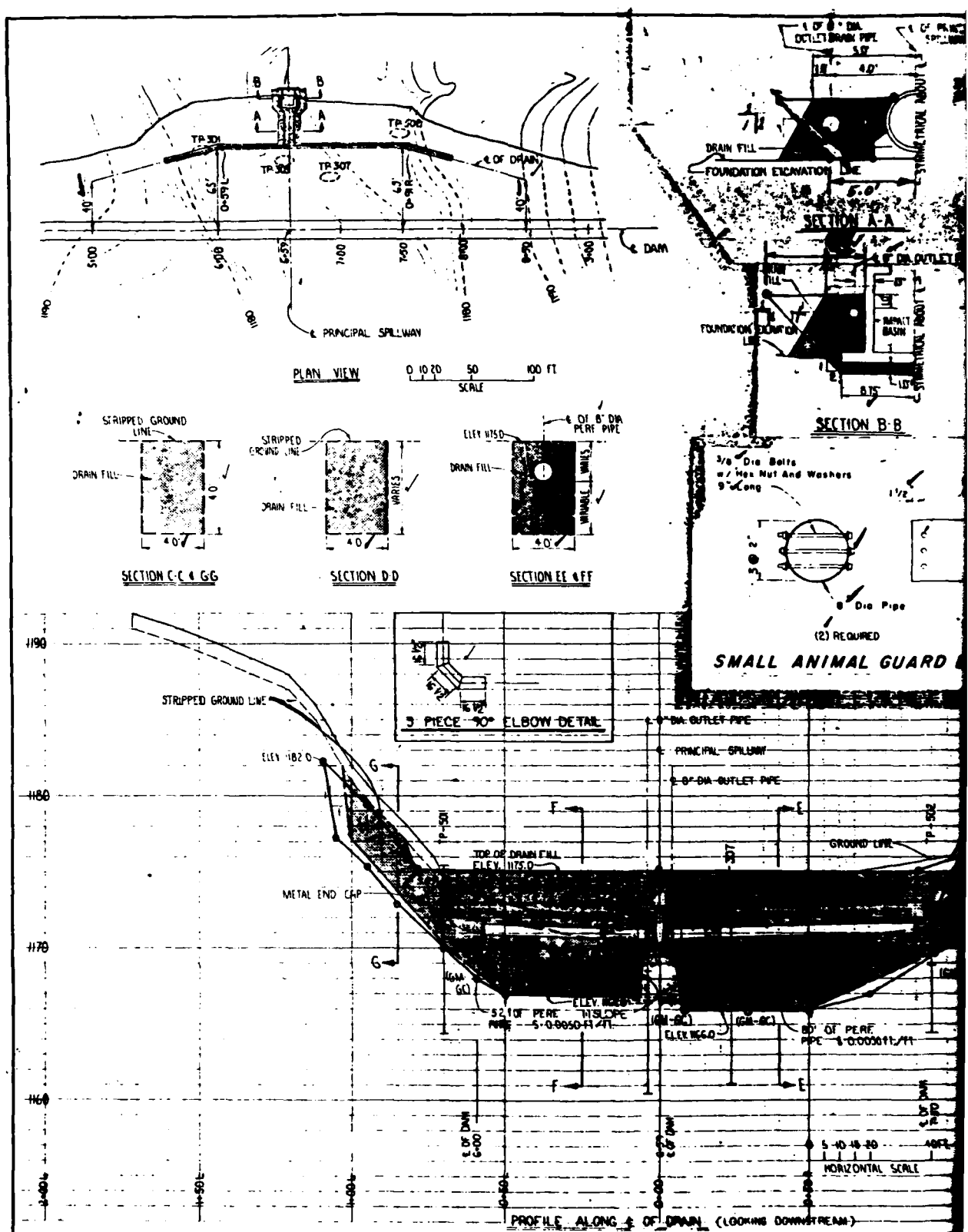
*410 cu yd Riprap
17. C.Y. BEDDING*

ALL ANTI-SEEP COLLARS MOVED 1.0 FT TO GIVE MORE CLEARANCE ON JOINTS OF 30" PIPE.

ALL DIMENSIONS ARE BASED ON BEST QUALITY PRACTICES AND SHALL BE FURNISHED TO DDC

DRAWN BY	G.J.G.	CHECKED BY	JAC	DATE	6/15/81
		5-27-81	APPROVED BY	JAC	6/16/81

DRAWING 80-778-B 26
NUMBER



AS BUILT

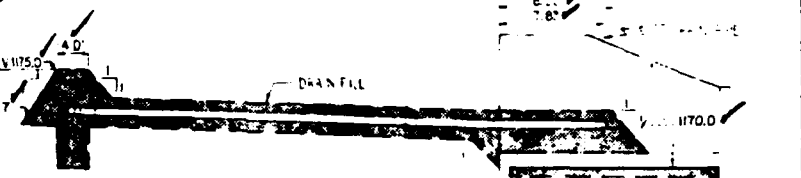
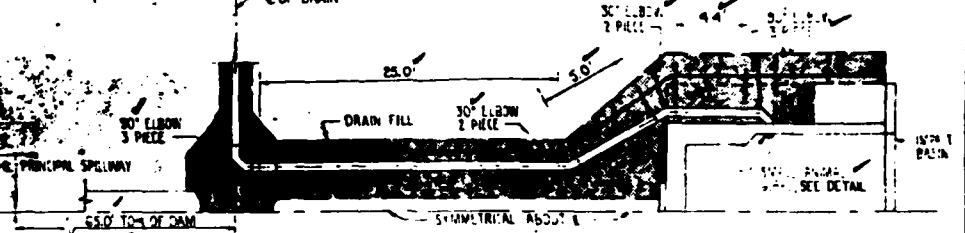
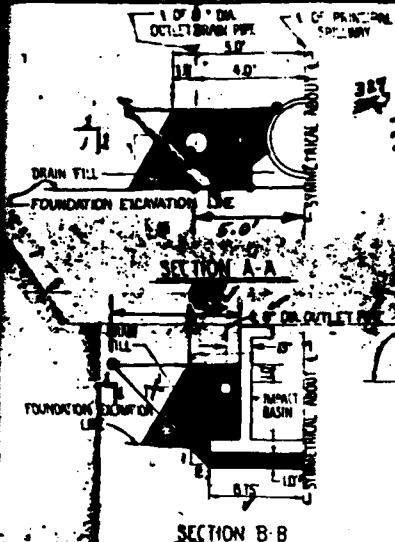
DRAINAGE SYSTEM DETAILS

QUANTITY SUMMARY

- 387 400 CIL YDS DRAIN FILL
- 200' OF 8" PERFORATED PIPE
- 30' 30° ELBOWS 8" DIA.
- (2) METAL END CAPS
- (4) 30° ELBOWS 8" DIA.

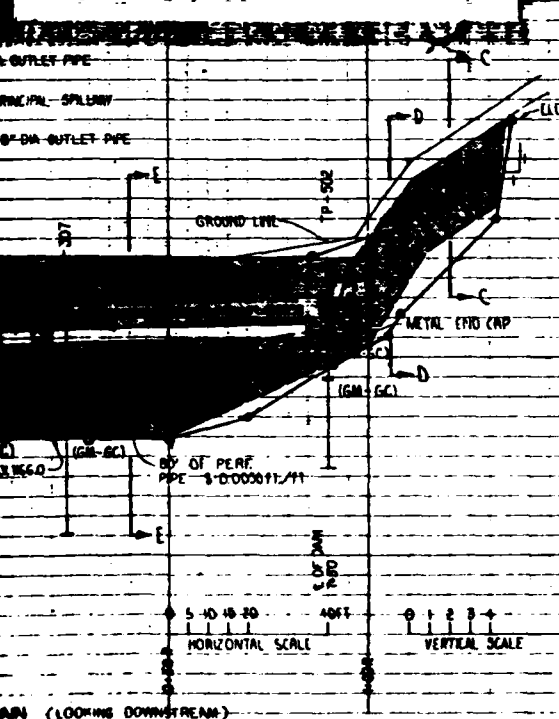
ALL DRAIN PIPE SHALL CONFORM TO SPECIFICATION 110 AND SHALL BE 8" DIA., GRAPE 1; CLASS I (ANNULAR CORRUGATIONS), OR CLASS II (HELICAL CORRUGATIONS); TYPE A (FULLY RUSTPROOF COATED) PERFORATED PIPE.

- 1. USE A MINIMUM OF 12" OF DRAIN FILL AROUND PIPES.
- 2. THE PROFILES AT THE BOTTOM OF ALL EXCAVATIONS AS SHOWN ARE ONLY APPROXIMATE. THE REQUIRED FINISHED GRADED WILL BE ESTABLISHED IN THE FIELD AT THE TIME OF CONSTRUCTION BY THE ENGINEER.

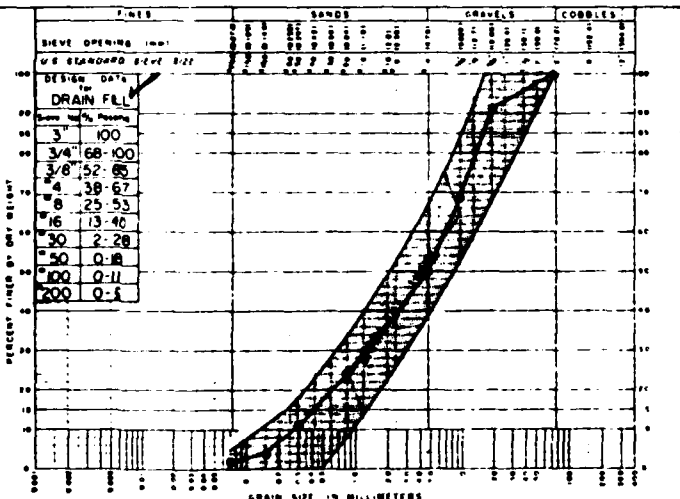


DRAIN FILL UNDER CONCRETE FLOOR WILL BE COMPACTED USING MANUAL TAMPERING EQUIPMENT.

SMALL ANIMAL GUARD DETAILS



GRAIN SIZE DISTRIBUTION GRAPH FOR DRAIN FILL



NANTICOKE CREEK WATERSHED PROJECT
SITE 7-B
FLOODWATER RETARDING DAM
TIOGA COUNTY, NEW YORK
DRAINAGE SYSTEM
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

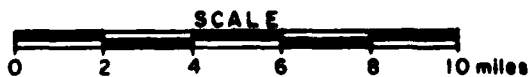
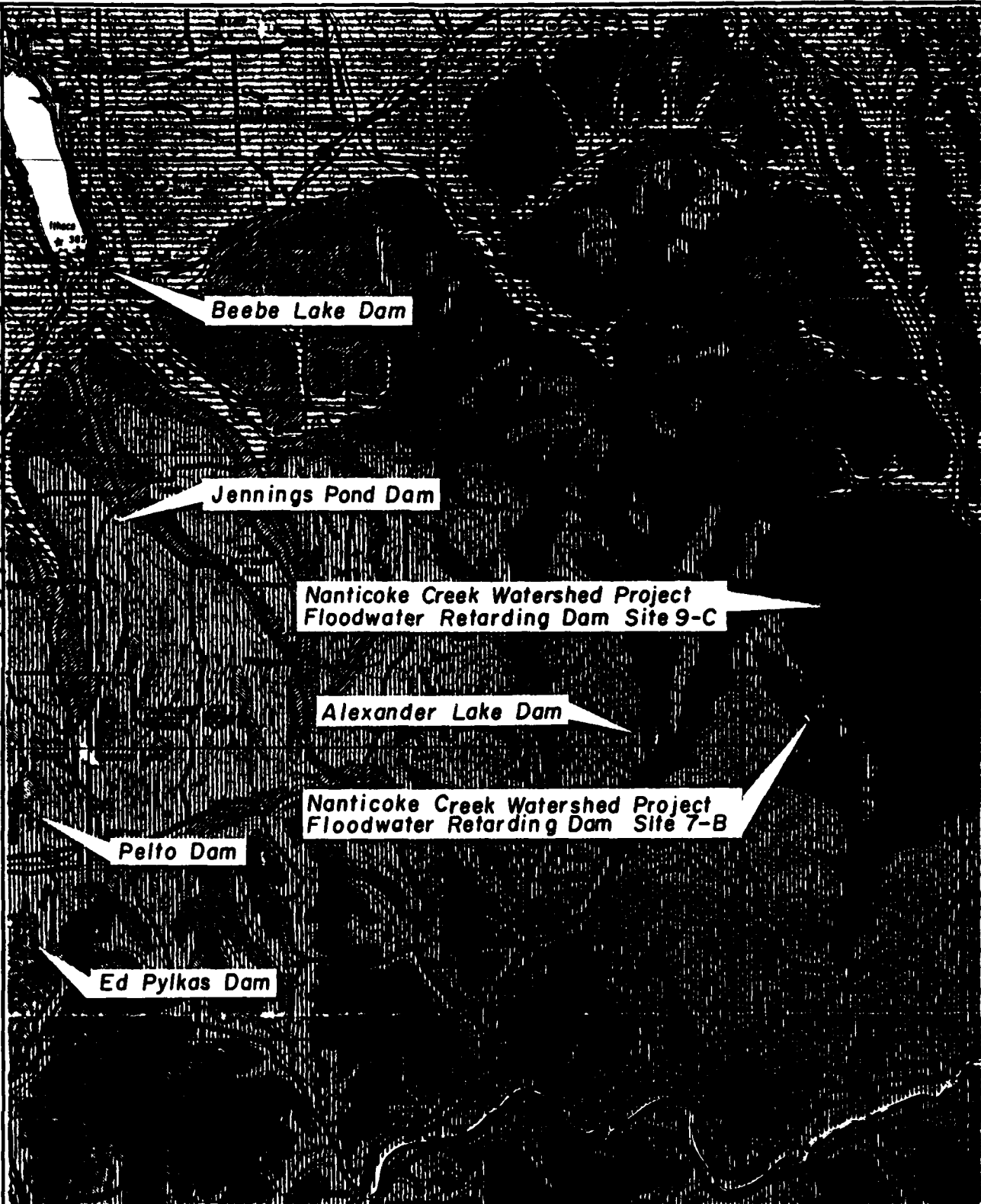
LC BERTSON 6/67
D ANGELO
W. GRAJNO, R. ALLEN 6/67
7 18 NY-2005-P

ONLY QUALITY MATERIALS TO BE USED

APPENDIX F

GEOLOGY MAP

DRAWN BY 8Y
 ACS 4-29-81
 CHECKED BY 132
 5/7/82
 DRAWING NUMBER 80-778-A3



REFERENCE:
 GEOLOGIC MAP OF NEW YORK, FINGER LAKES SHEET
 DATED: 1970, SCALE: 1:250,000

GEOLOGY MAP

D'APPOLONIA

DRAWING NUMBER 80-778-A6
 5/7/81
 5-7-81
 CHECKED BY AC
 APPROVED BY JHD
 ACS
 4-29-81
 DRAWN BY

LEGEND

CANADAWAY GROUP

800-1200 ft. (240-370 m.)

- Dcy Machias Formation—shale, siltstone; Rushford Sandstone; Caneadea, Canisteo, and Hume Shales; Canaseraga Sandstone; South Wales and Dunkirk Shales; In Pennsylvania: Towanda Formation—shale, sandstone.

JAVA GROUP

300-700 ft. (90-210 m.)

- Dj Wiscoy Formation—sandstone, shale; Hanover and Pipe Creek Shales.

WEST FALLS GROUP

1100-1600 ft. (340-490 m.)

- Dwn Nunda Formation—sandstone, shale.
 Dwg West Hill and Gardeau Formations—shale, siltstone; Roricks Glen Shale; upper Beers Hill Shale; Grimes Siltstone.
 Dwr lower Beers Hill Shale; Dunn Hill, Millport, and Moreland Shales.
 Dwc Nunda Formation—sandstone, shale; West Hill Formation—shale, siltstone; Corning Shale.
 Dwnm "New Milford" Formation—sandstone, shale.
 Dwrg Gardeau Formation—shale, siltstone; Roricks Glen Shale.
 Dws Slide Mountain Formation—sandstone, shale, conglomerate.
 Dwm Beers Hill Shale; Grimes Siltstone; Dunn Hill, Millport, and Moreland Shales

SONYEA GROUP

200-1000 ft. (60-300 m.)

- Ds In west: Cashaqua and Middlesex Shales.
 In east: Rye Point Shale; Rock Stream ("Enfield") Siltstone; Pulteney, Sawmill Creek, Johns Creek, and Montour Shales.

GENESEE GROUP AND TULLY LIMESTONE

200-1000 ft. (60-300 m.)

- Dg West River Shale; Genundewa Limestone; Penn Yan and Genesee Shales; all except Genesee replaced eastwardly by Ithaca Formation—shale, siltstone and Sherburne Siltstone.
 Dgo Oneonta Formation—shale, sandstone.
 Dgu Unadilla Formation—shale, siltstone.
 Dt Tully Limestone.

GEOLOGY MAP LEGEND

REFERENCE:

GEOLOGIC MAP OF NEW YORK, FINGER LAKES SHEET
 DATED: 1970, SCALE: 1:250,000

D'APPOLONIA

APPENDIX G
STABILITY ANALYSES

UNITED STATES GOVERNMENT

Memorandum

TO : W. S. Atkinson, State Conservation Engineer,
SCS, Syracuse, New York 13210

DATE: April 28, 1967

FROM : Lorn P. Dunnigan, Head, Soil Mechanics Laboratory,
SCS, Lincoln, Nebraska 68508

SUBJECT: ENG 22-5, New York WP-08, Nanticoke, Site No. 7B (Tioga County)

ATTACHMENTS

1. Form SCS-354, Soil Mechanics Laboratory Data, 1 sheet.
2. Form SCS-255, Triaxial Shear Test Data, 2 sheets.
3. Form SCS-352, Compaction and Penetration Resistance Report, 2 sheets.
4. Form SCS-357, Summary - Slope Stability Analysis, 2 sheets.
5. Investigational Plans and Profiles.

DISCUSSION

FOUNDATION

- A. Classification: The foundation materials at this site consist of glacial till on the abutments and water deposited (glacio-fluvial, glacio-lacustrine and alluvium) materials overlying till in the floodplain section.

These materials are described in the geology report. Gradation curves for several of the materials are also included in the geology report. The till is classed as GM-GC and GM.

- B. Blow Count: The blow count tests in the glacio-lacustrine silt and the glacial till indicate that this material may be considered as non-yielding for the loading range planned.

Forty six blows per foot were recorded in the lacustrine silt and blow counts generally in excess of 30 blows per foot were recorded for the till.

- C. Permeability: The permeability of the glacial till is expected to be low. Field estimates based on the D₂₀ size range from 0.01 to 0.0008 fpd.

EMBANKMENT

- A. Classification: The borrow material for this embankment will be glacial till from the emergency spillway.



Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

2 -- W. S. Atkinson -- 4/28/67

Lorn P. Dunnigan

Subj: ENG 22-5, New York, Nanticoke, Site No. 7B

The samples submitted contain about 36 percent gravel and 45 percent fines. The liquid limit is in the range of 30 and the PI is in the range of 10. The samples are classed as GC.

- B. Compacted Density: Standard compaction tests were made on the fraction passing the 3/4 inch sieve, (ASTM D-698, Method C). The compacted densities obtained were 124 pcf for sample 67W2415 (202.1) and 127.0 pcf for sample 67W2416 (202.2).
- C. Shear Strength: A triaxial shear test was made on sample 67W2415. The test was made on the material passing the 3/4 inch screen. The test specimens were compacted to 98 percent of standard Proctor density. The diameter of the test specimens was 4.0 inches. The degree of saturation for the four specimens tested ranged from 96.3% to 98.5%.

The total stress shear strength values obtained are $\phi = 19 \frac{1}{2}^\circ$, $c = 400$ psf and the effective stress shear strength values are $\phi = 31^\circ$, $c = 200$ psf.

These values are suggested for design.

SLOPE STABILITY

The stability of the proposed 2 1/2:1 downstream and 3:1 upstream slopes was checked with a Swedish circle method of analyses. A homogeneous embankment 43.6 feet high was assumed for the analysis. A phreatic line was considered from emergency spillway elevation. The downstream slope was analyzed both with and without a drain. Full drawdown was considered on the upstream slope. A summary of the analyses is attached. The factor of safety for a 2 1/2:1 downstream slope with a drain at $c/b = 0.6$ is 1.51. A 3:1 upstream slope has a factor of safety of 1.49. The analyses also shows that without a drain a 20 foot berm would be required on the downstream slope.

SETTLEMENT STRAINS

With removal of the topsoil organic matter, recent erosional debris, etc., as planned the foundation consolidation potential is expected to be low and differential settlements should be small.

3 -- W. S. Atkinson -- 4/28/67

Lorn P. Dunnigan

Subj: ENG 22-5, New York WP-08, Nanticoke, Site No. 7B

RECOMMENDATIONS

- A. Site Preparation: Remove the topsoil, organic matter and Recent erosional debris as planned. Large boulders that might interfere with proper placement and compaction should also be removed.

Slopes steeper than 2:1 should be flattened.

- B. Cutoff: We recommend that the cutoff trench bottom in glacial till. A trench depth of 4 feet will be adequate for the left abutment. Trench depths of 6 feet on the upper part and 7 feet on the lower part are required for the right abutment. Trench depths of 8 feet or more will be required in the floodplain section.

The trench should be backfilled with GC material compacted to a minimum of 98 percent of standard Proctor density with the control on the minus No. 4 1/2 inch.

- C. Principal Spillway: The proposed principal spillway location is shown on the attached form SCS-35B. Blow count in the materials below the surface zone is high and the consolidation potential is expected to be very low. This location appears to be satisfactory.

The trench slopes should be no steeper than 3:1.

A ϕ value of 31° is suggested for conduit loading computations.

- D. Drain: A drain is recommended to provide a safe outlet for foundation seepage and also to control the phreatic line in the embankment. We suggest a trench drain with a pipe outlet. The drain should be located at about $c/b = 0.6$ and it should extend up the abutments to permanent pool elevation or a little above.

The trench should penetrate the glacial till about 2 feet in the floodplain section. A minimum trench depth of 4 feet is suggested for the abutments.

The drain material should consist of sand-gravel mixture that contains less than 5 percent non-plastic fines.

- E. Embankment Design:

1. Placement of Material: A homogeneous embankment of glacial till is suggested. The till should be placed at minimum of 98 percent of standard Proctor density and the control should be on the minus 3/4 inch fraction. The placement moisture content should be slightly wet of optimum.

4 -- W. S. Atkinson -- 4/28/67

Lorn P. Dunnigan

Subj: ENG 22-5, New York WP-08, Nanticoke, Site No. 7B

2. The proposed 3:1 upstream and 2 1/2:1 downstream slopes have acceptable factors of safety provided a drain is used to control the phreatic line.
3. Settlement: An overfill allowance of 0.75 foot is suggested to compensate for residual consolidation in the fill and foundation.

Attachments

cc:

W. S. Atkinson, Syracuse (1)

W. L. Anderson, Syracuse

B. S. Ellis, Syracuse

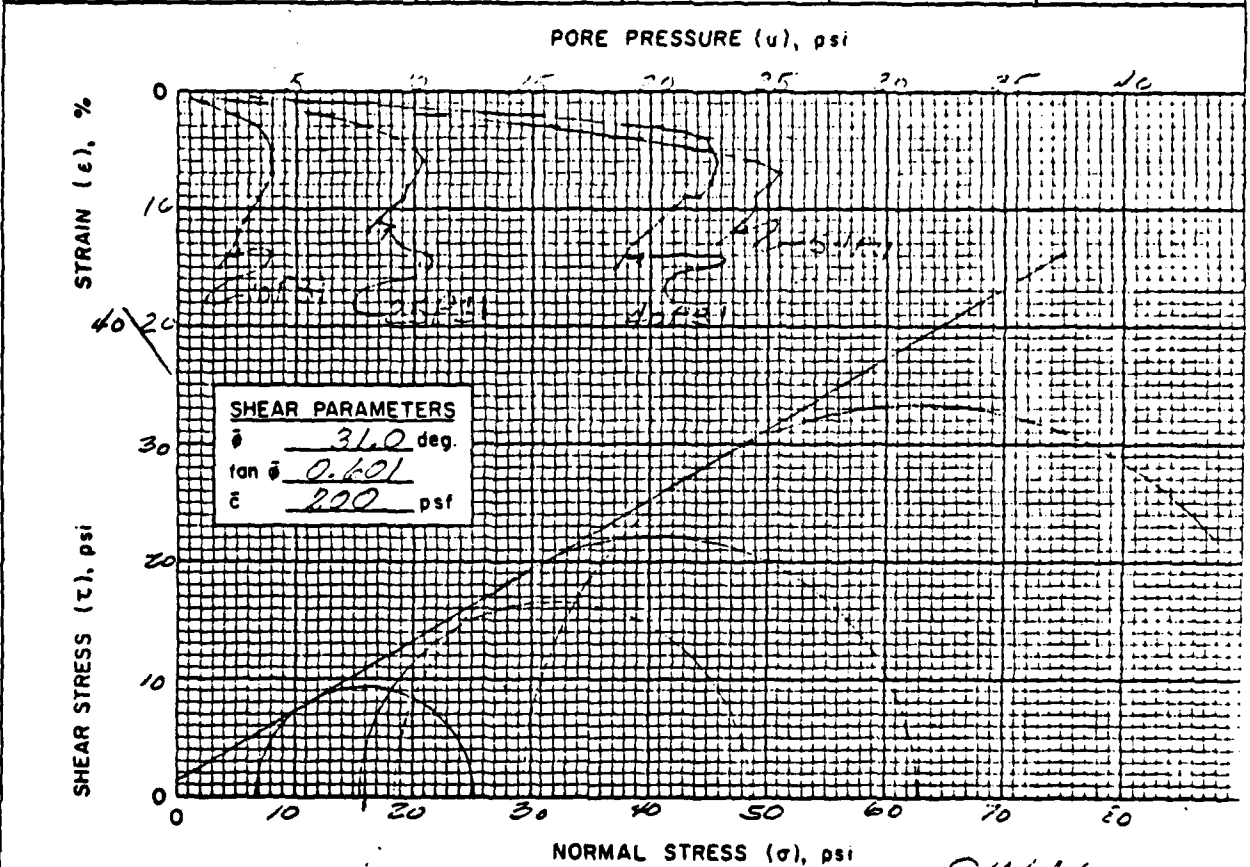
H. M. Kautz, Upper Darby

MATERIALS TESTING REPORT		U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE		TRIAXIAL SHEAR TEST	
PROJECT and STATE <u>Monticello Site No. 7-5 NEW YORK</u>				SAMPLE LOCATION	
FIELD SAMPLE NO. <u>EC3.1</u>		DEPTH <u>9.0'</u>		GEOLOGIC ORIGIN <u>Glacial Till</u>	
TYPE OF SAMPLE <u>DISTURBED</u>		TESTED AT <u>Sink - Lincoln</u>		APPROVED BY <u>LPD</u>	
				DATE <u>4-27-67</u>	
INDEX TEST DATA				SPECIMEN DATA	
USCS <u>GC</u> ; LL <u>29</u> ; PI <u>10</u>				HEIGHT <u>8.0</u> "; DIAMETER <u>4.0</u> "	
% FINER (mm): 0.002 <u>12</u> ; 0.005 <u>18</u> ; 0.075 (#200) <u>44</u>				MATERIALS TESTED PASSED <u>3/4</u> SIEVE	
G_s (-#4) <u>2.78</u> ; G_s (+#4) <u>2.63</u>				METHOD OF PREPARATION <u>STATIC</u>	
STANDARD: γ_d MAX. <u>124.0</u> pcf; w_0 <u>12</u> %				<u>MOLDED IN 4 LIFTS</u>	
MODIFIED: γ_d MAX. _____ pcf; w_0 _____ %				MOLDING MOISTURE <u>14.3</u> %	
				MOLDED AT _____ % OF γ_d MAXIMUM	
DRY DENSITY		MOISTURE CONTENT, %		TIME OF CONSOLIDATION (hrs)	MINOR PRINCIPAL STRESS σ_3 (psi)
INITIAL pcf <input type="checkbox"/> g/cc <input type="checkbox"/>	CONSOLIDATED pcf <input checked="" type="checkbox"/> g/cc <input type="checkbox"/>	START OF TEST	DEG. OF SAT. AT START OF TEST	END OF TEST	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)
121.1	123.8	14.4	97.0	13.3	10.0
121.5	124.4	14.1	96.3	12.9	25
121.6	125.2	14.1	96.5	12.6	40
121.1	126.1	14.6	98.5	12.5	54
DEVIATOR STRESS ($\sigma_1 - \sigma_3$), psi					
SHEAR STRESS (τ), psi					
NORMAL STRESS (σ), psi					
REMARKS					

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	TRIAXIAL SHEAR TEST with pore pressure measured
-----------------------------	--------------------------------------------------------------	----------------------------------------------------

PROJECT and STATE <u>ALABAMA STATE HIGHWAY 10.7-5 NEW YORK</u>	SAMPLE LOCATION		
TYPE OF SAMPLE <u>ONE PCE</u>	TESTED AT <u>SAF - L. 11.11</u>	APPROVED BY <u>LPD</u>	DATE <u>4-27-67</u>

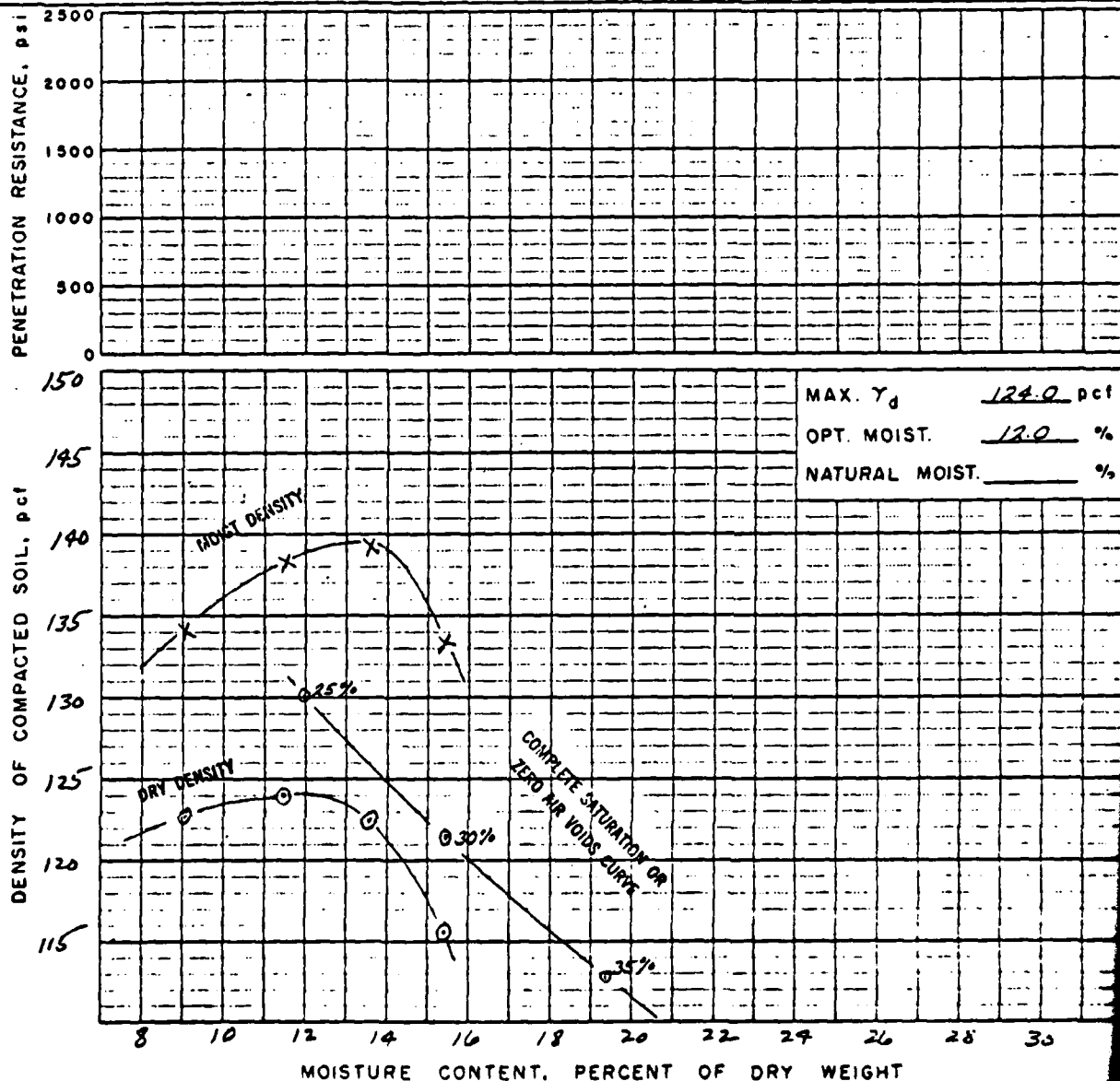
MINOR PRINCIPAL STRESS, σ_3 (psi)	PORE PRESSURE, u (psi)	EFFECTIVE MINOR PRINCIPAL STRESS, $\bar{\sigma}_3$ (psi)	DEVIATOR STRESS, $\sigma_1 - \sigma_3$ (psi)	FAILURE CRITERIA	AXIAL STRAIN AT FAILURE, E (%)
10.4	3.7	6.7	15.6		3.0
15	9.5	15.5	33.3		9.2
20	21.6	18.4	44.2		9.1
54	24.5	29.5	66.3		10.0



REMARKS

For use in the STATE HIGHWAY
DESIGN, THE DATA TO BE
USED IS THE DATA TO BE
USED

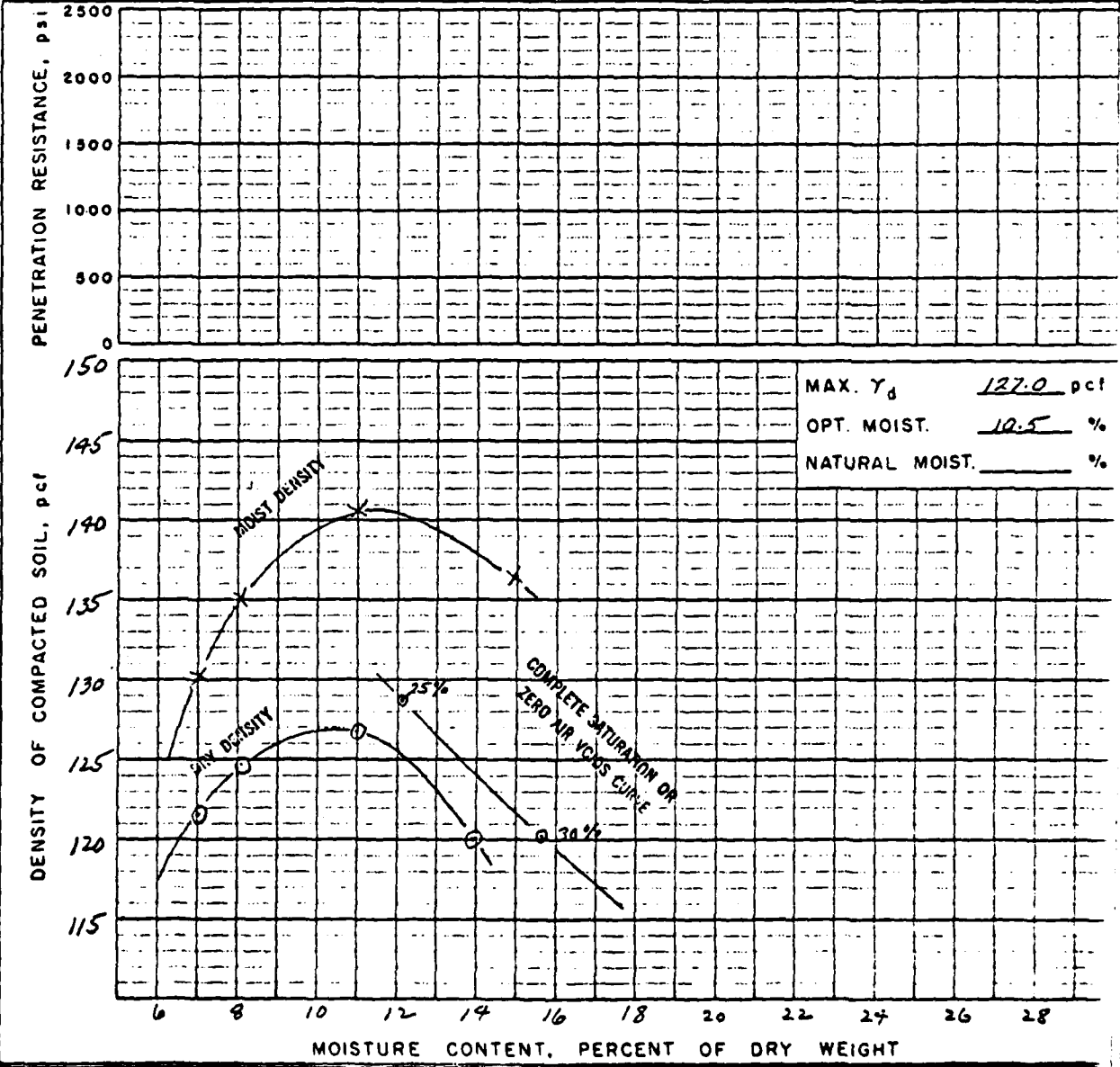
MATERIALS TESTING REPORT		U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE		COMPACTION AND PENETRATION RESISTANCE	
PROJECT and STATE <u>Nanticoke #7-B</u> <u>New York</u>					
FIELD SAMPLE NO. <u>202.1</u>		LOCATION			DEPTH
GEOLOGIC ORIGIN <u>Glacial Till</u>		TESTED AT <u>S.M.L. Lincoln</u>	APPROVED BY <u>LPD</u>	DATE <u>4-27-67</u>	
CLASSIFICATION <u>GC</u> LL <u>29</u> PI <u>10</u>		CURVE NO. <u>1</u> OF <u>2</u>			
MAX. PARTICLE SIZE INCLUDED IN TEST <u>< 3/4"</u>		STD (ASTM D-698) <input checked="" type="checkbox"/> ; METHOD <u>C</u>			
SPECIFIC GRAVITY (G _s) { MINUS NO. 4 <u>2.78</u> PLUS NO. 4 <u>2.63</u>		MOD (ASTM D-1557) <input type="checkbox"/> ; METHOD <u> </u>			
		OTHER TEST <input type="checkbox"/> (SEE REMARKS)			



REMARKS
 CURVE IS FOR THE MINUS NO. 3/4 FRACTION
 GRADATION OF TOTAL SAMPLE
< NO. 200 44 %; < NO. 4 63 %; < 3 IN. 97 %

NOT FOR CONSTRUCTION
 NOT TO BE USED FOR DESIGN

MATERIALS TESTING REPORT		U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE		COMPACTION AND PENETRATION RESISTANCE	
PROJECT AND STATE <u>Naticook # 7-B</u> <u>New York</u>					
FIELD SAMPLE NO <u>202.2</u>		LOCATION			DEPTH
GEOLOGIC ORIGIN <u>Glacial Till</u>		TESTED AT <u>S.M.L. Lincoln</u>		APPROVED BY <u>LPD</u>	DATE <u>4-27-67</u>
CLASSIFICATION <u>GC</u> LL <u>30</u> PI <u>10</u>		CURVE NO. <u>2</u> OF <u>2</u>			
MAX. PARTICLE SIZE INCLUDED IN TEST <u>< 3/4"</u>		STD. (ASTM D-698) <input checked="" type="checkbox"/> METHOD <u>C</u>			
SPECIFIC GRAVITY (G _s) { MINUS NO. 4 <u>2.75</u> PLUS NO. 4 <u>2.62</u>		MOD. (ASTM D-1557) <input type="checkbox"/> METHOD _____			
		OTHER TEST <input type="checkbox"/> (SEE REMARKS)			

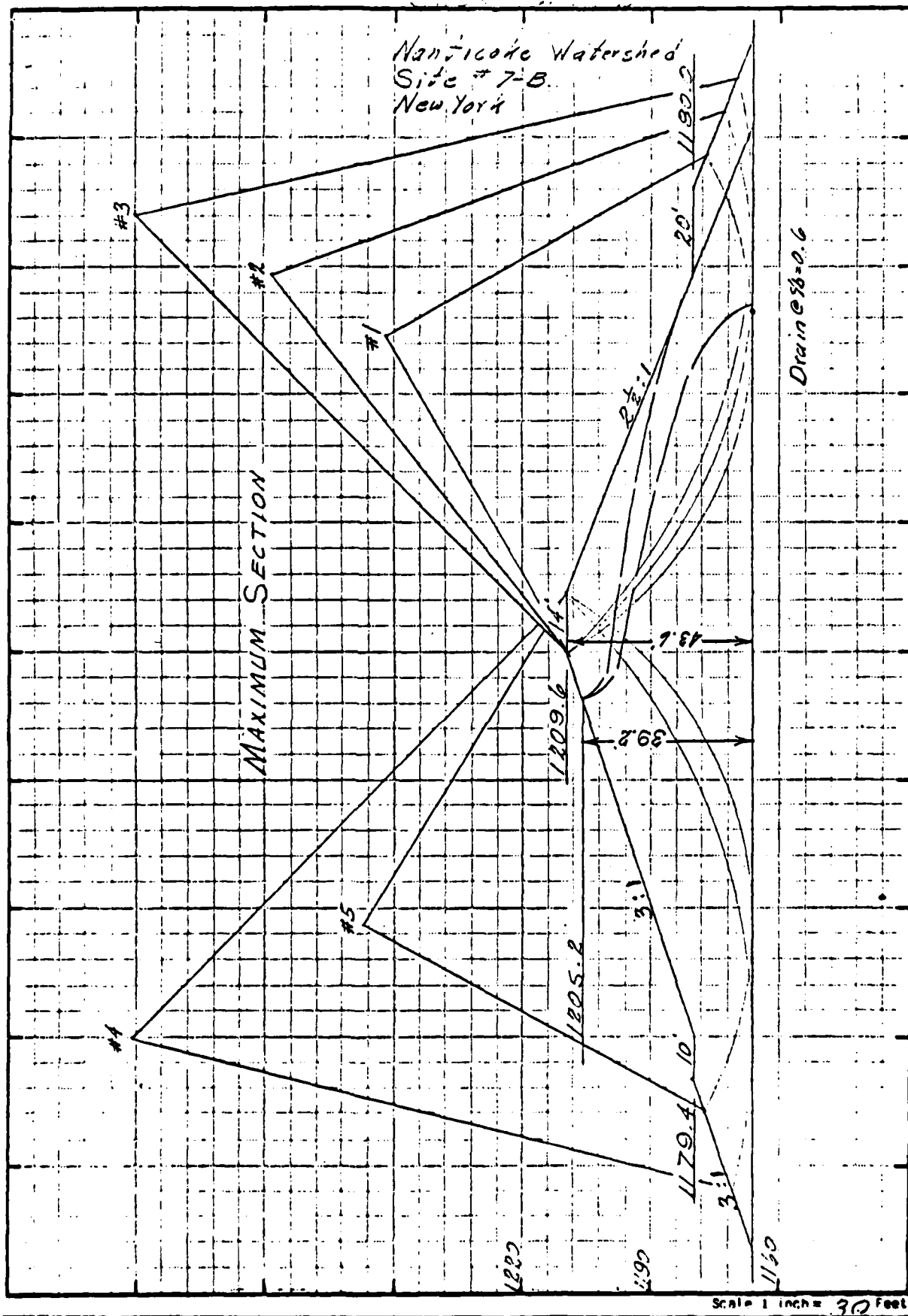


REMARKS

CURVE IS FOR THE MINUS NO. 3/4 FRACTION
GRADATION OF TOTAL SAMPLE

< NO. 200 47 %; < NO. 4 64 %; < 3 IN. 100 %

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APPENDIX H

REFERENCES

APPENDIX H

REFERENCES

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